

Texas Nonpoint Source Grant Program

***Recreational Use Attainability Analysis
for Ten Creeks in the Red River and Neches River Basins***

**TSSWCB Project # 14-52
Revision 0**

Quality Assurance Project Plan

Texas State Soil and Water Conservation Board

**Prepared by
Texas Institute for Applied Environmental Research
Stephenville, Texas**

**Effective Period: Upon TSSWCB Approval through October 2015
with annual updates required**

Questions concerning this quality assurance project plan should be directed to:

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A1 Approval Sheet

Quality Assurance Project Plan (QAPP) for *Recreational Use Attainability Analysis for Ten Creek in the Red River and Neches River Basins*.

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Title: TSSWCB Quality Assurance Officer (QAO)

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Title: TIAER Project Coordinator

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Name: Jeff Stroebe

Title: TIAER Field Operations Supervisor

Signature: _____ Date: _____

Name: Sarah Robinson

Title: TIAER Field Operations Supervisor

Signature: _____ Date: _____

Name: Anne McFarland

Title: TIAER Project QAO

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List of Acronyms

CAFO	Confined Animal Feeding Operation
CAR	Corrective Action Report
CBMS	Computer Based Mapping System
DEM	Digital Elevation Model
DMR	Discharge Monitoring Report
DOQQ	Digital Ortho Quarter Quads
ECHO	Enforcement & Compliance History Online
EPA	United States Environmental Protection Agency
FM	Farm-to-Market
GIS	Geographic Information System
GPS	Global Positioning System
HWY	Highway
ICIS	Integrated Compliance Information System
NAIP	National Agricultural Imagery Program
NASS	National Agricultural Statistics Service
NHD	National Hydrography Dataset
NLCD	National Land Cover Dataset
NPDES	National Pollution Discharge Elimination System
PM	Project Manager
QA	Quality Assurance
QAM	Quality Assurance Manual
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QPR	Quarterly Progress Report
RUAA	Recreational Use Attainability Analysis
SH	State Highway
SOP	Standard Operating Procedure
SSURGO	Soil Survey Geographic database
SWQMIS	Surface Water Quality Monitoring Information System
TCEQ	Texas Commission on Environmental Quality

TIAER	Texas Institute for Applied Environmental Research
TMDL	Total Maximum Daily Load
TPDES	Texas Pollution Discharge Elimination System
TNRIS	Texas Natural Resources Information System
TSSWCB	Texas State Soil and Water Conservation Board
TSWQS	Texas Surface Water Quality Standards
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WWTF	Wastewater Treatment Facility

A3 Distribution List

Organizations, and individuals within, which will receive copies of the approved QAPP and any subsequent revisions include:

Texas State Soil and Water Conservation Board (TSSWCB)

PO Box 658

Temple, TX 76503

Name: Wesley Gibson

Title: TSSWCB PM

Name: Mitch Conine

Title: TSSWCB QAO

Texas Institute for Applied Environmental Research (TIAER)

Tarleton State University, Box T-0410

Stephenville, TX 76402

Name: Nikki Jackson

Title: TIAER PM

Name: Leah Taylor

Title: TIAER Project Coordinator

Name: Jeff Stroebe

Title: TIAER Field Operations Supervisor

Name: Sarah Robinson

Title: TIAER Field Operations Supervisor

Name: Anne McFarland

Title: TIAER Project QAO

A4 Project/Task Organization

The following is a list of individuals and organizations participating in the project with their specific roles and responsibilities:

TSSWCB

Wesley Gibson

TSSWCB PM

Maintains a thorough knowledge of work activities, commitments, deliverables, and time frames associated with project. Develops lines of communication and working relationships between TIAER and TSSWCB. Tracks deliverables to ensure that tasks are completed as specified in the contract. Responsible for ensuring that the project deliverables are submitted on time and are of acceptable quality and quantity to achieve project objectives. Participates in the development, approval, implementation, and maintenance of the QAPP. Assists the TSSWCB QAO in technical review of the QAPP. Responsible for verifying that the QAPP is followed by project participants. Notifies the TSSWCB QAO of particular circumstances that may adversely affect the quality of data derived from the collection and analysis of samples. Enforces corrective action.

Mitch Conine

TSSWCB QAO

Reviews and approves QAPP and any amendments or revisions and ensures distribution of approved/revised QAPPs to TSSWCB and project participants. Responsible for verifying that the QAPP is followed by project participants. Determines that the project meets the requirements for planning, quality assurance (QA), quality control (QC), and reporting under the TSSWCB Texas Nonpoint Source Grant Program. Coordinates or conducts audits of field and laboratory systems and procedures. Monitors implementation of corrective actions.

TIAER

Nikki Jackson

TIAER PM

Responsible for ensuring tasks and other requirements assigned to TIAER in the contract are executed on time and are of acceptable quality. Coordinates attendance at conference calls, training, meetings, and related project activities with the TSSWCB. Monitors and assesses the quality of work. Responsible for verifying the QAPP is followed and the project produces data of known and acceptable quality. Complies with corrective action requirements. Reports status, issues, and progress of the overall project to TSSWCB PM.

Leah Taylor

TIAER Project Coordinator and Data Manager

Responsible for writing and maintaining the QAPP. Oversee data management for the study. Responsible for reviewing and formatting data according to workplan specifications for final reporting of the data. Provide the point of contact for resolving issues related to the data.

Develop and maintain relationships with landowners and stakeholders. Ensure tasks and other requirements in the contract are executed on time and are of acceptable quality. Responsible for verifying the QAPP is followed and the project produces data of known and acceptable quality. Comply with corrective action requirements.

Jeff Stroebel & Sarah Robinson

TIAER Field Operations Supervisors

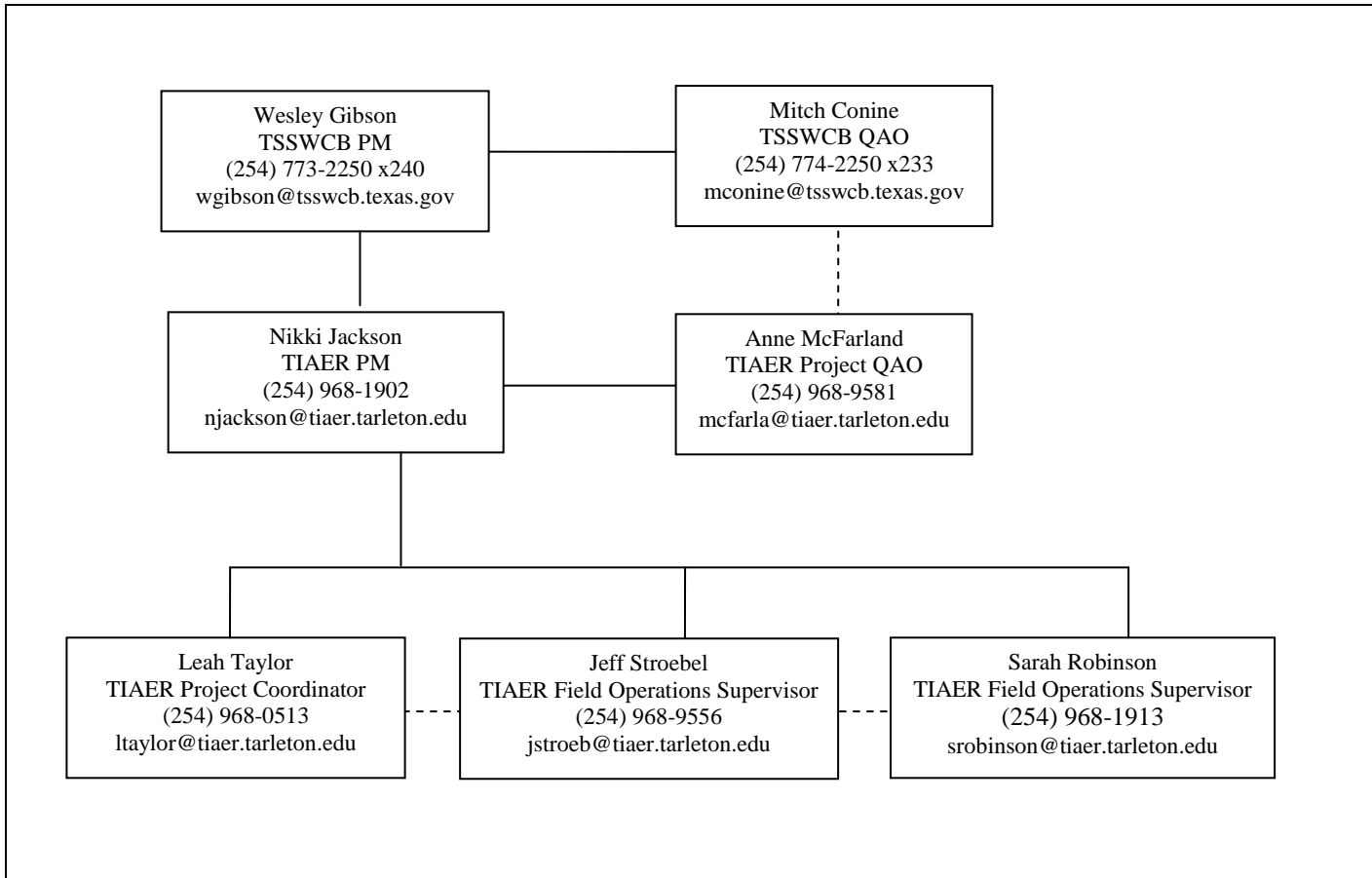
Responsible for supervising all aspects of the measurements and data collection for surface water and other RUAA information in the field. Responsible for the acquisition of field data measurements in a timely manner that meet the quality objectives specified in Section A7 (Table A.1), as well as the requirements of Sections B1 through B8. Responsible for field scheduling, staffing, and ensuring that staff is appropriately trained as specified in A8. Responsible for verifying the QAPP is followed and the project produces data of known and acceptable quality. Comply with corrective action requirements.

Anne McFarland

TIAER Project QAO

Responsible for coordinating development and implementation of the project QA program. Responsible for maintaining records of project QAPP distribution, including appendices and amendments. Responsible for maintaining written records of sub-tier commitment to requirements specified in this QAPP. Responsible for identifying, receiving, and maintaining project QA records. Responsible for coordinating with the TSSWCB QAO to resolve QA-related issues. Notifies TIAER PM of particular circumstances that may adversely affect the quality of data. Coordinates the review of technical QA material and data related to water quality monitoring system design and analytical techniques. Supervises monitoring systems audit for the project.

Figure A4.1 Organization Chart – Lines of Communication



Lines of Management —————
 Lines of Communication - - - - -

A5 Problem Definition/Background

This QAPP addresses ten creeks located in the eastern region of Texas listed for bacterial impairments on the 2012 Texas 303(d) List (see Appendix A for area location map). Five creeks are within the Red River Basin and five creeks are in the Neches River Basin. Mud Creek (0201A), Bois D' Arc Creek (0202A), Choctaw Creek (0202F), Smith Creek (0202G), and Iron Ore Creek (0202K) are located in the Red River Basin. Kickapoo Creek in Henderson County (0605A), the Neches River above Lake Palestine (Segment 0606), Prairie Creek (0606A), Mud Creek (0611C), and West Mud Creek (0611D) are located in the Neches River Basin. Because there are two different Mud Creeks included in this project, the water body identification (0201A or 0611D) will be used in conjunction with the creek name throughout this document to clearly identify which water body is being referenced.

Mud Creek (0201A) is located in Bowie County and its watershed includes portions of the City of DeKalb, Texas. Mud Creek (0201A) extends from the confluence of the Red River to the upstream perennial portion of the stream northwest of DeKalb in Bowie County. Bois D' Arc Creek (0202A) extends from the confluence of the Red River upstream to the headwaters northwest of Whitewright in Grayson County. The Bois D' Arc Creek watershed includes the cities of Bonham and Dodd City, Texas and encompasses portions of Whitewright, Trenton, Windom, and Honey Grove, Texas. Choctaw Creek (0202F) extends from the confluence with the Red River near Denison upstream near the intersection of SH 56 in Grayson County. Smith Creek (0202G) flows from the confluence of Pine Creek north of the City of Paris and extends to the upstream portion of the stream in north Paris, Texas in Lamar County. Iron Ore Creek (0202K) is a tributary of Choctaw Creek (0202F) and extends from the confluence of Choctaw Creek upstream to the headwaters near FM 120 west of the City of Denison, Texas in Grayson County.

Kickapoo Creek in Henderson County (0605A) extends from Lake Palestine east of the City of Brownsboro in Henderson County to the confluence of Slater Creek. Kickapoo Creek in Henderson County flows into Van Zandt County where it terminates at the confluence with an unknown tributary about 1.62 km north of FM 858 in Van Zandt County. The Neches River above Lake Palestine (Segment 0606) flows 33 miles downstream of SH 31 in Henderson and Smith Counties. The Segment 0606 watershed encompasses the City of Van and portions of the City of Chandler. Prairie Creek (0606A) is a tributary of the Neches River (Segment 0606) and begins at the confluence with the Neches River above Lake Palestine and flows upstream where it comes to an end at an unnamed tributary in the southern portion of the City of Lindale, Texas. Prairie Creek (0606A) is a tributary of the Neches River above Lake Palestine and extends downstream to the intersection of US 69 in Lindale, Texas. The Prairie Creek watershed encompasses large portions of the City of Tyler. Mud Creek (0611C) extends from the confluence with Angelina River at the Cherokee and Nacogdoches County line south of the City of Reklaw, Texas to a point immediately upstream of the confluence of Prairie Creek in Smith County. Of note, the Prairie Creek associated with Mud Creek (0611C) flows from Lake Tyler and is not the same water body as Prairie Creek (0606A) that flows into the Neches River above Lake Palestine. West Mud Creek (0611D) is a tributary of Mud Creek (0611C) and extends from the confluence of Mud Creek in Cherokee County upstream to the confluence of an unnamed

tributary in the City of Tyler. Both Mud Creek (0611C) and West Mud Creek (0611D) include portions of Cherokee County and the City of Tyler in Smith County.

The 2012 Texas 303(d) List included bacterial impairments for water bodies within the Red River Basin are assessment units 0201A_01 for Mud Creek, 0202A_01 for Bois D' Arc Creek, 0202F_01 and 0202F_02 for Choctaw Creek, 0202G for Smith Creek, and 0202K for Iron Ore Creek.

The 2012 Texas 303(d) List included bacterial impairments for water bodies within the Neches River Basin are assessment units 0605A_01 and 0605A_02 for Kickapoo Creek in Henderson County, 0606_01 and 0606_02 for The Neches River above Lake Palestine, 0606A_01 and 0606A_03 for Prairie Creek, 0611C_01 and 0611C_02 for Mud Creek, and 0611D_01 and 0611D_02 for West Mud Creek.

The Texas Commission on Environmental Quality (TCEQ) and the TSSWCB established a joint, technical Task Force on Bacteria Total Maximum Daily Loads (TMDLs) in September 2006 charged with making recommendations on cost-effective and time-efficient bacteria TMDL development methodologies. The Task Force recommended the use of a three-tier approach that is designed to be scientifically credible and accountable to watershed stakeholders. In June 2007, the TCEQ and the TSSWCB adopted the principles and general process recommended by the Task Force. Fundamental in the three-tier approach is ensuring that the appropriate water quality standard (i.e., designated use) is applied to the water body before initiating any watershed planning activity (e.g., TMDL or watershed protection plan).

Major revisions to the Texas Surface Water Quality Standards (TSWQS) were adopted by TCEQ in 2010 and approved by the United States Environmental Protection Agency (EPA) in 2011, including modifications to contact recreation use and bacteria criteria. As part of this process, TCEQ developed formal procedures for conducting Recreational Use Attainability Analysis (RUAAs). In order for a new category of recreational use, and, thus, a different water quality criterion for bacteria to be applied to a water body, a RUAA will need to be conducted. TCEQ and TSSWCB have collaborated on developing a list of priority water bodies for collecting information needed for RUAAs and the water bodies for this project (Mud Creek (0201A), Bois D' Arc Creek, Choctaw Creek, Smith Creek, Iron Ore Creek, Kickapoo Creek in Henderson County, the Neches River above Lake Palestine, Prairie Creek, Mud Creek (0611C), and West Mud Creek) are on that list. Because primary contact recreation use is presumed for the water bodies in the study area and it is not known with certainty that recreational use in these water bodies occurs. The findings from an RUAA will provide information regarding the level of recreational use actually occurring in these water bodies.

In accordance with the Watershed Action Planning process (<http://www.tceq.texas.gov/waterquality/planning/wap/>) and the *Memorandum of Agreement Between the TCEQ and the TSSWCB Regarding TMDLs, Implementation Plans, and Watershed Protection Plans*, the TSSWCB has agreed to take the lead role in addressing the bacteria impairments in this project's study area. Through this project, the TSSWCB and TIAER will work with local stakeholders to complete the data collection components of an RUAA and at the

end of this project have adequate data that either supports the existing designated use (primary contact recreation) or supports a change in designated use (e.g., secondary contact recreation) for the nine unclassified water bodies and one classified segment in this project.

A6 Project/Task Description

The overall goal of the project is to collect data that provide stakeholders and agencies with sufficient information to determine recreational use status throughout the ten watersheds (Mud Creek (0201A), Bois D' Arc Creek, Choctaw Creek, Smith Creek, Iron Ore Creek, Kickapoo Creek in Henderson County, the Neches River above Lake Palestine, Prairie Creek, Mud Creek (0611C), and West Mud Creek). This project consists of performing Comprehensive RUAA's on five unclassified water bodies (0201A, 0202A, 0202F, 0202G, and 0202K) within the Red River Basin, four unclassified water bodies (0605A, 0606A, 0611C, and 0611D) and one classified water body (Segment 0606) within the Neches River Basin for the purpose of ascertaining the level of recreational use within each water body. This project will follow the March 2014 *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey*.

These comprehensive RUAA's consist of four main tasks: a) public participation and stakeholder interaction through educational outreach meetings, interviews and historical review of the recreational use of each water body; b) compilation of existing Geographic Information System (GIS) data pertaining to each watershed including spatial identification of potential sources, such as point source dischargers; c) completion of the required two RUAA field surveys of each creek; and d) review of water quality and other data to characterize each watershed. This QAPP focuses specifically on the direct data collection associated with the RUAA field surveys.

Project-related tasks and the schedule of deliverables are defined in Table A6.1.

Table A6.1. Schedule of Milestones

Task	Project Milestones	Start¹	End²
2	Quality Assurance		
2.1	QAPP development and approval by the TSSWCB	Month 1	Month 8
2.2	Annual QAPP updates and amendments, as needed	Month 10	Month 24
3	Assess Attainability of Recreational Use		
3.1	Conduct RUAA site reconnaissance and coordinate with landowners for access where appropriate	Month 1	Month 6
3.2	Develop comprehensive GIS inventory	Month 1	Month 8
3.3	Identify sites for RUAA data collection	Month 7	Month 8
3.4	Conduct historical information review on recreation uses	Month 1	Month 18
3.5	Conduct RUAA field surveys	Month 9	Month 12
3.6	Collect digital photographic record	Month 9	Month 12
3.7	Conduct interviews	Month 9	Month 18
3.8	Develop technical RUAA report	Month 13	Month 24
4	Public Participation and Stakeholder Coordination		
4.1	Facilitate public participation and coordinate stakeholder involvement	Month 1	Month 24
4.2	Contact entities on Contact Information Form	Month 1	Month 3
4.3	Conduct at a minimum two informational meetings, one prior to the first RUAA field survey and the second to present findings. An interim meeting of preliminary findings may be conducted after the first field survey.	Month 2	Month 24
4.4	Participate in other public meetings, as appropriate	Month 1	Month 24
4.5	Develop and disseminate educational material	Month 1	Month 24
5	GIS Inventory and Water Quality Review		
5.1	Develop comprehensive GIS inventory	Month 1	Month 18
5.2	Conduct historical data review of each water body to assess and characterize trends in water quality, specifically bacteria	Month 1	Month 18

¹ Month 1 = November 2013

² Month 24 = October 2015

Using GIS inventory and other pertinent information, TIAER will identify sites, with the help of stakeholders, for RUAA field data collection. Sites will be located in areas where the water body is accessible to the public and have the highest potential for recreational use (primary contact). Sites will be well-spaced and, where practical, distributed such that there are at least 3 sites for every 5 miles of stream. Due to the significant amount of public input considered during the RUAA, relocation of survey sites may occur without an amendment to the QAPP as noted in the March 2014 *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey*, but require notification and approval by the TSSWCB PM, who will notify the TCEQ Water Quality Standard Group for their approval. Relocation may include but is not limited to instances when landowner access has changed, new public information regarding survey locations is made

available, or suitability of a previously identified survey location has changed due to lack of access or unsafe conditions.

RUAA survey site selection is predicated on reconnaissance trips, public participation, and stakeholder interaction. An initial reconnaissance trip will be completed prior to meeting with stakeholders about the project, and follow-up trips will occur when interaction with local landowners provides opportunities for additional sites. Two surveys will be conducted at each of the selected sites by TIAER. Each survey will be conducted per the March 2014 version of the *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey* and will include the collection of transect information along a stretch of the creek at each site documenting the presence or absence of water recreation activities and characteristics regarding stream flow type and pool depths (see Appendix B for RUAA Field Data Sheets). Obstructions, stream color, water surface characteristics, stream trash and observed evidence of wildlife (tracks or fecal material) will be included in the photographic record of each site. Interview survey information will also be collected from individuals either actively recreating at each site or knowledgeable of the site and the project creeks in general (see Appendix C). Each survey will be performed at a time of year under weather and hydrologic conditions that are conducive to observing recreational use, which means when air temperatures are warm to hot ($>70^{\circ}$ F). Field surveys will be conducted during the period people would most likely be using the water body for contact recreation. A historical information review will be conducted on recreation use that occurred on each creek on and after November 28, 1975.

To ascertain the suitability of the streams for contact recreation use, field surveys shall document hydrological characteristics of the stream, such as flow type, width and depth of channel and substantial pools, bank access, and stream substrate. Information to be collected shall at least satisfy those questions found on the Field Data Sheet from the *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014). TIAER shall document antecedent rainfall conditions (approximately 30 days prior to fieldwork) and the source of the data per the RUAA procedures. TIAER shall also collect a digital photographic record of each selected site during the field surveys. Photographs shall include upstream, left and right bank, and downstream views clearly depicting the entire channel and each transect measured. Any evidence of observed uses or indications of human use shall be photographed as well obstructions to use and hydrologic modifications that characterize the water body.

Section B1 contains detailed information on direct data to be collected during the RUAA field surveys. Maps of RUAA site locations are presented in Appendix A.

Information on acquired or non-direct data is addressed in Section B9.

A7 Quality Objectives and Criteria

The project objective is to collect data that may be used to support decisions related to recreational use designation. Data to be collected in the RUAA surveys at each site are listed in *Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey* (March 2014). A copy of the field data sheet is located in Appendix B. Most of the data to be collected is based on observations, such as channel flow status, stream type and recreational activities, or experience of individuals interviewed and not directly measured with an instrument. Direct measurements and quality objectives are indicated below.

Measurements under wadeable conditions include thalweg depth, length and width of substantial pools; and stream width. Thalweg depth should be reported in meters to 2 significant figures. If depths are too deep at a particular transect to measure then thalweg should be reported as >1.5 meters. Stream width should be noted to represent 1) the typical average width of the 300 meter reach; 2) the width at the narrowest point of the stream within the 300 meter reach; and (3) the width at the widest point of the stream within the 300 meter reach. Stream width values should be reported in meters to 2 significant figures.

For substantial pools, the width (at the widest point) and deepest depth of each pool should be reported. A substantial pool is considered a pool greater than 10 meters in length for the purposes of a RUAA Survey. Report pool measurements to 2 significant figures in meters. If depths are too deep to measure then report >1.5 meters.

Measurements on non-wadeable streams, if accessible, should represent typical widths along the 300 meter reach with measurements reported in meters to 2 significant figures.

A photographic record will be made of each site during each survey. Photographs will include an upstream view, left and right bank views, downstream view (as described in the Field Data Sheets), any evidence of recreational uses or indications of human use, hydrologic modifications, etc. Photograph should clearly depict the entire channel and, if feasible, the depth of water in the channel and pools or the absence of water, if dry. Photos should document evidence of recreational use (e.g., rope swings) and actual recreation. No identifiable photographs should be taken of minor children without the permission of an accompanying adult. Efforts should be made not to show the faces of any child (person considered a minor) photographed. Photos may also show a lack of use, such as dry creek beds. Photos need an obvious scale. Photographs must be cataloged in a manner that indicates the site location, date, view orientation and what is being shown.

Precision

Precision is the degree to which a set of observations or measurements of the same property, obtained under similar conditions, conform to themselves. It is a measure of agreement among replicate measurements of the same property, under prescribed similar conditions, and is an indication of random error.

The precision of the information gathered for this project, because it is largely observations, will be dependent on training of field crew personnel for consistency.

Bias

Bias is a statistical measurement of correctness and includes components of systemic error. A measurement is considered unbiased when the value reported does not differ from the true value. Bias in measurements (both direct and observational) will be addressed through training on obtaining the information required on the RUAA field data sheets to assure consistency within and between field teams.

Representativeness

Representativeness is a measure of how accurately a monitoring program reflects actual water quality conditions and recreational uses. The representativeness of the data is dependent on the sampling locations, the conditions under which surveys are performed, and the survey procedures.

The RUAA surveys will ideally be performed at a frequency of three sites per five stream miles to assure maximum capture of stream recreational uses and conditions. Additionally, sites will be surveyed hydrologically, preferentially during high recreational use potential. Representativeness will be measured with the completion of data collected in accordance with the approved QAPP.

Comparability

Confidence in the comparability of data sets from this project and those for similar uses is based on the commitment of TIAER to use only the methods and QA/QC protocols prescribed in the *Procedures for a Comprehensive Recreational UAA and a Basic UAA Survey* (March 2014) in accordance with quality system requirements and as described in this QAPP.

Completeness

The completeness of the data is basically a function of weather, site access, and the availability and willingness of individual responders. Ideally, 100% of the data should be available. Unavailable data due to weather and the inability to access the sites and interview individuals are to be expected. Therefore, it will be a general goal of the project that 90% data completion is achieved. Interviewing the required contacts, completing the field data sheets and interview forms for each site, and providing the required photographic evidence, maps, and final report will guarantee the completeness of the each data set.

A8 Special Training/Certification

Field personnel will receive training in proper field analysis techniques prior to the RUAA field surveys. Before actual field measurements occur, field personnel will demonstrate to the TIAER Project QAO or designee their ability to properly perform field analysis procedures required on the RUAA field data sheet (see Appendix B). Training will be documented and retained in the TIAER Monitoring Staff Training file and be available during a monitoring systems audit. TIAER staff collecting Global Positioning System (GPS) data will be certified TCEQ and will maintain their certification throughout the project.

A9 Documents and Records

Quarterly progress reports (QPRs) will note activities conducted in connection with the RUAA, items or areas identified as potential problems, and any variations or supplements to the QAPP. Corrective Action Reports (CARs) will be utilized when necessary (see example in Appendix D). CARs that result in any changes or variations from the QAPP will be made known to pertinent project personnel and documented in an update or amendment to the QAPP. All QPR and QAPP revisions will be distributed to personnel listed in Section A3.

The TSSWCB may elect to take possession of records at the conclusion of the specified retention period.

RUAA Reports and Forms

- Information to be collected shall at least satisfy those questions found on Contact Information Form (Appendix C)
- Field Data Sheets and Interview Forms in electronic format (Appendix B and C)
- Digital photographic record, cataloged in an appropriate manner

Records and Documents Retention Requirements

<u>Document/Record</u>	<u>Location at TIAER</u>	<u>Retention</u>	<u>Form</u>
QAPP, amendments, and appendices	Central Files	5 years	Paper
QAPP distribution documentation	Central Files	5 years	Paper/Electronic
Training records	Central Files	5 years	Paper
Field notebooks or field data sheets	Central Files	5 years	Paper/Electronic
RUAA Contact Information, Field Data, and Interview Forms	Central Files	5 years	Paper/Electronic
Field SOPs	Central Files	5 years	Paper/Electronic
Corrective action documentation	Central Files	5 years	Paper/Electronic

Revisions to the QAPP

Until the work described is completed, this QAPP shall be revised as necessary and reissued annually or revised and reissued within 120 days of significant changes, whichever is sooner.

Amendments

Amendments to the QAPP may be necessary to reflect changes in project organization, tasks, schedules, objectives, and methods; address deficiencies and nonconformances; improve operational efficiency; and/or accommodate unique or unanticipated circumstances. Requests for amendments are directed in writing from the TIAER PM to the TSSWCB PM. Changes are effective immediately upon approval by the TSSWCB PM and QAO.

Amendments to the QAPP and the reasons for the changes will be documented, and revised pages will be forwarded to all persons on the QAPP distribution list by the TIAER QAO.

Amendments shall be reviewed, approved, and incorporated into a revised QAPP during the annual revision process or within 120 days of the initial approval in cases of significant changes.

As per the March 2014 *TCEQ Procedures for a Comprehensive RUAA and a Basic RUAA Survey*, site changes may be made to this QAPP without the need for an amendment. If site changes occur, these changes will be incorporated into a revised QAPP during the annual revision for distribution. Prior to the annual revision, all individuals on the QAPP distribution will be notified of any site changes with an updated site list within 120 days of notification and approval by the TSSWCB PM.

B1 Sampling Process Design (Experimental Design)

TIAER will collect information that can be used to evaluate recreational uses in the study area. Methods used and sampling process design shall be consistent with the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014). TIAER will conduct field surveys at selected sites during periods people would most likely use the water body for contact recreation; surveys shall ascertain the suitability of the streams for contact recreation use and shall document the hydrological characteristics of the stream.

Field data will be collected following procedures detailed in *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014). Tables B1.1 – B1.10 provide the sites selected for use in the project for each watershed. Maps of the RUAA sites within each watershed are provided in Appendix A showing the location of sites as identified in Tables B1.1-B1.10. TIAER used respective tax appraisal districts to help identify landowners along each water body and stakeholders within each watershed area.

Mud Creek (0201A) Mud Creek (0201A) is just under 36 river miles long, which indicates a goal of 21 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.2). Eleven sites were selected for the RUAA, nine of which are publically accessible via road crossings and two of which are accessible via private property (Table B1.1). Public access to Mud Creek (0201A) is made available by 10 road crossings. Attempts were made to include all public road crossings and TCEQ sampling stations in the list of selected sites. However, the public road crossing at County Road 3204 was omitted due to its close proximity to site MU07 at FM 992 (see Figure Appendix A.2). The RUAA sites include the three existing monitoring stations in TCEQ's SWQMIS along the mainstem of Mud Creek (Table B1.1). While there are no parks along Mud Creek, the Mud Creek Hunting Club, which is private property, exists at the lower end of Mud Creek where it meets the Red River. This property comprises approximately 1,537 acres and has approximately 1.6 miles of creek frontage wherein lies RUAA site MU01. This property is known to be used for hunting deer, ducks and hogs and is being actively managed for wildlife.

Much of the access along Mud Creek (0201A) is only available via private property. All land owners along the creek were contacted concerning access for potential RUAA survey sites via mailings. During site reconnaissance trips, attempts were made to directly contact landowners by stopping by potential creek-side residences and knocking on doors. Residences behind locked gates were not approached and phone calls to the corresponding addresses were attempted. Landowners throughout the watershed were contacted regarding a public meeting held on March 11, 2014 in DeKalb, Texas to discuss the upcoming RUAA survey. The meeting was advertised through local newspapers and local radio channels. Mailings went out to 76 individuals within the Mud Creek (0201A) watershed and of these people, 11 attended the March 11th meeting.

The average distance between survey sites is 2.73 river miles and ranges from 1.62 to 4.41 miles. The largest gap between survey sites is 4.41 river miles between sites MU02 and MU03. The second largest gap is 4.29 river miles from MU11 to the upper end of the water body. There is no suitable public access to Mud Creek (0201A) along these two stretches without accessing private property to which landowner access has not been granted. According to a landowner whose property is near

the confluence of Mud Creek (0201A) with the Red River, there has been a change in the flow pattern of Mud Creek that occurred due to flooding in the 1990s. The flooding rerouted Mud Creek's path to the Red River. Flow still follows parts of the original path noted by the TCEQ assessment unit line, but only during high runoff events when water flows out of New Lake. TCEQ was contacted regarding this change in the flow pattern of Mud Creek and its potential impact on the RUAA survey. TCEQ approved the newer flow path for Mud Creek (0201A) for the RUAA survey noted in Figure Appendix A.2.

No permitted discharges or concentrated animal feeding operations (CAFOs) exist within the Mud Creek watershed. The City of De Kalb is the only municipality within the watershed and its wastewater treatment facility (WWTF) discharges to Anderson Creek south of Mud Creek. In working with landowners to obtain access to RUAA site locations for Mud Creek (0201A), TIAER found that the path of Mud Creek to the Red River has changed notably from what is indicated by the TCEQ GIS assessment unit layer. Most of the flow to the Red River from Mud Creek now follows a more direct route to the Red River as shown in Figure Appendix A.2. This revised water body path for Mud Creek has been reviewed and approved by TCEQ for the RUAA field survey.

Table B1.1. Mud Creek (0201A) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	MU01	Mud Creek on private property	33.583317	-94.459357	0.00	1.24	Private
	MU02	Mud Creek on private property	33.569774	-94.463188	1.71	2.95	Private
18515	MU03	Mud Creek at FM 992	33.551125	-94.490567	4.41	7.36	Public
	MU04	Mud Creek at CR 3109	33.553345	-94.513665	2.20	9.56	Public
	MU05	Mud Creek at CR 3220	33.554069	-94.554343	3.15	12.71	Public
	MU06	Mud Creek at CR 3202	33.527237	-94.573278	3.40	16.11	Public
	MU07	Mud Creek at FM 992	33.523625	-94.593752	2.27	18.37	Public
21480	MU08	Mud Creek at FM 2735	33.524633	-94.619022	1.99	20.37	Public
15319	MU09	Mud Creek at Highway 259	33.531165	-94.637320	1.62	21.98	Public
	MU10	Mud Creek at CR 3216	33.545468	-94.656069	2.58	24.57	Public
	MU11	Mud Creek at FM 1326	33.567025	-94.693842	3.93	28.50	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Bois D' Arc Creek (0202A) Bois D' Arc Creek (0202A) is just under 70 river miles long, indicating a goal of 41 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.3). Twenty-six sites were selected for the RUAA, 18 of which are publically accessible via road crossings and eight of which are accessible via private property (Table B1.2).

Public access to Bois D' Arc Creek is made available primarily through road crossings. The Caddo National Grasslands (<http://www.forestcamping.com/dow/southern/cadinfo.htm>) is the only park within the Bois D' Arc Creek watershed. The Caddo National Grasslands has five developed campgrounds. The Bois D' Arc Trailhead campground offers bike riders and hikers a network of more than 26 miles of trails in and around Coffee Mill Lake. Presence of wildlife is not uncommon among the Bois D' Arc Trailhead campground. Selected RUAA site BA03 at the crossing of FM409 is located within the Caddo National Grasslands. Legacy Ridge Golf Club is also located within the watershed and backs up to Bois D' Arc creek on the southwest near the crossing of State Highway 82. Site BA11 is located at this crossing and includes within its reach the portion of the creek that runs by the golf course.

To obtain RUAA survey sites on private lands, landowners with creek-front property were contacted regarding access to Bois D' Arc Creek. A public stakeholder meeting held on March 4, 2014 in Bonham, Texas. The meeting was advertised in local newspapers and through other appropriate media outlets such as the local radio channels. Mailings went to 106 individuals within the Bois D' Arc Creek watershed and of these people, 11 attended the March 4th meeting. In addition, during site reconnaissance trips, attempts were made to contact landowners directly by stopping by potential creek-side residences and knocking on doors. Residences behind locked gates were not approached and phone calls to the corresponding address were attempted.

The average distance between RUAA survey sites is 2.61 river miles and ranges from 10.34 to 0.91 miles. The largest gap between survey sites is 10.34 river miles between BA01 and BA02. Any access, public or private, to the 15 mile stretch of Bois D' Arc Creek between RM 5 and RM20 (see Figure 2-1) is extremely limited by dense forest vegetation and lack of any trails or roads leading to the creek or its vicinity. Additionally, according to local landowners and the Forest Ranger of Caddo National Grasslands, log jams, shallow depths and other obstacles impede navigation by boat during the time of year surveys are to be conducted. The second largest gap between sites is 5.41 river miles between BA09 and BA10. In both these gap areas, private land access needed was denied.

The selected RUAA sites include six of the eight TCEQ monitoring stations along the mainstem of Bois D' Arc Creek (Figure Appendix A.3). Of the existing TCEQ stations, TCEQ station 15053 was not indicated as a potential RUAA site because it is not publically accessible and because of its close proximity to site BA23 off FM 898, which has public access. Additionally, TCEQ station 15749 was not used because it is no longer an actively sampled station (based on an inquiry directed to DFW TCEQ office regarding this site) and is not publically accessible. TCEQ station 15749 is also in close proximity to RUAA site BA12 off HWY 56, which is publically accessible.

Within the Bois D' Arc Creek watershed, there are six municipal WWTFs, two of which directly discharge into Bois D' Arc Creek (Table B1.2). The other four municipal WWTFs discharge

into creeks or tributaries that then flow into Bois D' Arc Creek. The largest permitted discharge is the City of Bonham with a permitted average daily flow of 2.5 MGD. The combined average daily discharge for all six municipal facilities is 3.73 MDG. There is also one concrete plant with a general discharge permit located within the City of Bonham. There are no active CAFO permits within the Bois D' Arc Creek watershed, although a cattle feedlot, which now has a cancelled permit, was located in the northeastern part of the Bois D' Arc Creek watershed.

Table B1.2. Bois D' Arc Creek (0202A) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	BA01	Bois D' Arc at Highway 79	33.823594	-95.861075	0.0	2.08	Public
15318	BA02	Bois D' Arc at FM 100	33.758829	-95.915858	10.34	12.42	Public
21029	BA03	Bois D' Arc at FM 409	33.744184	-95.960929	5.27	17.69	Public
	BA04	Bois D' Arc on private property	33.71228	-95.971248	2.34	20.03	Private
	BA05	Bois D' Arc on private property	33.699713	-95.975860	0.91	20.94	Private
20167	BA06	Bois D' Arc at FM 1396	33.68251	-95.986050	1.97	22.92	Public
	BA07	Bois D' Arc on private property	33.66959	-96.015590	3.07	25.99	Private
	BA08	Bois D' Arc on private property	33.661431	-96.039056	2.60	28.59	Private
	BA09	Bois D' Arc at CR 2645	33.654094	-96.049879	1.17	29.76	Public
	BA10	Bois D' Arc on private property	33.624106	-96.128097	5.41	35.17	Private
21028	BA11	Bois D' Arc at Highway 82	33.602776	-96.138291	1.60	36.78	Public
	BA12	Bois D' Arc at Highway 56	33.575833	-96.155752	2.12	38.89	Public
	BA13	Bois D' Arc at FM 271	33.555036	-96.170013	1.66	40.55	Public
18652	BA14	Bois D' Arc at Highway 78	33.540933	-96.179917	1.14	41.70	Public
	BA15	Bois D' Arc at State Highway 11	33.475448	-96.214454	5.15	46.84	Public
	BA16	Bois D' Arc at CR 896	33.462640	-96.248463	2.27	49.11	Public
	BA17	Bois D' Arc on private property	33.461315	-96.266065	1.06	50.17	Private
	BA18	Bois D' Arc on private property	33.467597	-96.283316	1.26	51.43	Private
	BA19	Bois D' Arc at CR 4525	33.476077	-96.302888	2.35	53.78	Public

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	BA20	Bois D' Arc at CR 4510	33.491414	-96.325166	2.86	56.63	Public
	BA21	Bois D' Arc at State Highway 11	33.497822	-96.336595	1.79	58.43	Public
	BA22	Bois D' Arc at CR 4300	33.505674	-96.349406	2.01	60.44	Public
15036	BA23	Bois D' Arc at FM 898	33.521796	-96.387400	3.97	64.41	Public
	BA24	Bois D' Arc at State Highway 69	33.519423	-96.402670	1.28	65.69	Public
	BA25	Bois D' Arc on private property	33.523931	-96.412694	0.81	66.50	Private
	BA26	Bois D' Arc at FM 697	33.529022	96.420459	0.77	67.27	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Choctaw Creek (0202F) Choctaw Creek (0202F) is just over 44 river miles long, which indicates a goal of 26 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.4). Seventeen sites were selected for the RUAA, 14 of which are publically accessible via road crossings and three of which are accessible via private property (Table B1.3). The selected RUAA sites include all seven existing monitoring stations in TCEQ's SWQMIS along Choctaw Creek's mainstem.

No parks were noted along Choctaw Creek, but public access to Choctaw Creek is available via several road crossings. Attempts were made to include all public road crossings. However, public crossing at OB Groner Road was not selected due to its close proximity to CH15 on private property and CH14 at the crossing of Old Dorchester Road. Additionally, where Choctaw Creek intersects Game Farm Road near the confluence with the Red River, public access is not available as the road is private, high-fenced and behind a locked gate. Attempts at contacting landowner off Game Farm Road were unsuccessful; therefore, this location was not available as an RUAA survey site.

Landowners throughout the watershed with river front property were contacted regarding access to Choctaw Creek for potential RUAA sites, and a public meeting was held on March 10, 2014 in Sherman, Texas to discuss the upcoming RUAA survey. A public stakeholder meeting held on March 10, 2014 in Sherman, Texas. Of note, the public meeting in Sherman also addressed proposed RUAA sites in Iron Ore Creek. The meeting was advertised via local newspapers and radio channels. Mailings went out to 94 individuals in the Choctaw Creek watershed and of these people, 8 were present at the March 10th meeting. The individuals contacted for the public meeting were those that lived along Choctaw Creek and within the Choctaw Creek watershed. In addition, during site reconnaissance trips, attempts were made to contact landowners directly by stopping by potential creek-side residences and knocking on doors. Residences behind locked gates were not approached and phone calls to the corresponding addresses were attempted.

The average distance between survey sites is 2.55 river miles and ranges from 1.12 to 5.28 miles. The largest gap between survey sites is 5.28 river miles between sites CH07 at HWY 56 and CH08 at Ida Road. The second largest gap is 4.50 river miles between CH05 at HWY 69 and CH06 at HWY 82. There are no public road crossings between these two gap areas and attempts to secure private land access to the creek were unsuccessful in these locations.

Two municipal WWTF dischargers and one general permit for a concrete facility exist within the Choctaw Creek watershed (Table B1.3). The City of Sherman with a population of over 39,000 has the largest permitted discharge at 16 MGD. There are no permitted CAFOs within the Choctaw Creek watershed. The Iron Ore Creek watershed flows into the Choctaw Creek watershed and there are two small permitted WWTFs that discharge into tributaries of Iron Ore Creek (see Table B1.3). These two permitted WWTFs within the Iron Ore Creek subwatershed of Choctaw Creek have a combined permitted discharge of 0.087 MGD.

Table B1.3. Choctaw Creek (0202F) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	CH01	Choctaw Creek at Carpenters Bluff	33.718920	-96.401853	0.0	2.76	Public
	CH02	Choctaw Creek on Private Property	33.718565	-96.424275	1.39	4.15	Private
	CH03	Choctaw Creek on Private Property	33.718460	-96.431112	1.59	5.74	Private
16130	CH04	Choctaw Creek at FM 1753	33.719069	-96.454296	2.39	8.13	Public
16123	CH05	Choctaw Creek at Highway 69	33.685629	-96.471763	4.13	12.26	Public
18370	CH06	Choctaw Creek at Highway 82	33.650300	-96.481123	4.50	16.76	Public
10108	CH07	Choctaw Creek at Highway 56	33.633614	-96.498211	3.20	19.96	Public
10109	CH08	Choctaw Creek at Ida Road (also shown as FM 697)	33.607861	-96.525410	5.28	25.24	Public
10111	CH09	Choctaw Creek at Highway 11	33.594155	-96.560342	4.35	29.59	Public
10112	CH10	Choctaw Creek at Luella Road	33.584985	-96.576553	1.94	31.53	Public
	CH11	Choctaw Creek on Private Property	33.575344	-96.585891	1.25	32.77	Public
	CH12	Choctaw Creek at Highway 75	33.571800	-96.602700	1.31	34.08	Public
	CH13	Choctaw Creek at Farmington Road	33.571860	-96.640500	3.41	37.50	Public
	CH14	Choctaw Creek at Old Dorchester Road	33.580040	-96.65720	1.89	39.38	Public
	CH15	Choctaw Creek on Private Property	33.585650	-96.66780	1.12	40.51	Private
	CH16	Choctaw Creek at John Cummings Road	33.596260	-96.67940	1.48	41.99	Public
	CH17	Choctaw Creek at Pleasant Home Road	33.606080	-96.69290	1.59	43.58	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 10 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Smith Creek (0202G) Smith Creek (0202G) is just under 6 river miles long, which indicates a goal of 3 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.5). Currently, 3 sites are selected for the RUAA, two of which are publically accessible via road crossings and one of which is accessible via private property (Table B1.4).

Public access to Smith Creek is limited to road crossings. No city or public parks are located along the mainstem of Smith Creek.

Landowners throughout the watershed were contacted about a public meeting held on March 6, 2014 in Paris, Texas to discuss the upcoming RUAA survey. Mailings went to 11 individuals in the Smith Creek watershed, of which 3 individuals attended the March 6th meeting. This meeting was advertised via local newspapers and radio channels. During this meeting, an effort was made to solicit access to private lands, particularly in the gap areas between public roads. The individuals contacted for the meeting were those that lived along Smith Creek and within the Smith Creek watershed.

The Campbell Soup Supply LLC is a large landholder within the Smith Creek watershed. The Campbell Soup property comprises approximately 1,271 acres, which includes approximately 3 miles of the 5.6 total river miles of Smith Creek. Attempts were made to gain permission to access the Campbell Soup property for RUAA survey sites, however, access permission was denied. Land managers for Campbell Soup were present at the March 6th meeting and indicated a willingness to fill out RUAA interview forms, but noted that Campbell Soup tightly controls access to the land along Smith Creek.

The average distance between survey sites is 2.23 river miles and ranges from 1.16 to 3.47 miles. The largest gap between survey sites of 3.47 river miles is between SM02 and SM03, the majority of which is owned by Campbell Soup Supply LLC, which has denied access.

Of the two existing TCEQ monitoring stations along the mainstem of Smith Creek (Figure Appendix A.5), only TCEQ station 21027 is included. TCEQ station 17044 was excluded due to its close proximity to site SM03 and an inability to gain permission from landowners whose property would have been accessed from this location.

Attempts were made to include all public road crossings in the list of selected sites. However, the crossing at Old Lake Crook Road was not selected due to its close proximity to site SM02. Other noted road crossings, particularly with regard to the Campbell Soup property, were private rather than public roads.

There are two permitted facilities within the Smith Creek watershed that discharge directly or indirectly to Smith Creek (Table B1.4). The Campbell Soup Paris Plant is the largest discharger with a permitted average daily discharge of 10 MGD. The additional facility, the Paris Energy Generation Plant, is permitted to discharge a low amount of industrial stormwater. No CAFOs are located within the Smith Creek watershed.

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	SM01	Smith Creek on private property	33.726042	-95.555513	0.0	0.76	Private
	SM02	Smith Creek at Lake Crook Road	33.718856	-95.567561	1.16	1.91	Public
21027	SM03	Smith Creek at Loop 286/Hwy 82	33.684449	-95.570382	3.47	5.38	Public

Table B1.4. Smith Creek (0202G) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Iron Ore Creek (0202K) Iron Ore Creek (0202K) is just at 19 river miles long, which indicates a goal of 11 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.6). Eleven sites were selected for the Iron Ore Creek RUAA, all of which are publically accessible via road crossings (Table B1.5). This includes one TCEQ station collocated with RUAA site IO05. There were no parks along Iron Ore Creek, and although the desired number of sites could be obtained via road crossings, efforts were made to obtain some RUAA sites off private lands to obtain a more even spatial distribution of sites.

All landowners within the Iron Ore Creek watershed were contacted regarding a public meeting held on March 10, 2014 in Sherman to discuss the upcoming RUAA survey. Of note, the public meeting in Sherman also addressed proposed RUAA sites in Choctaw Creek. Mailings were sent to 63 people within the Iron Ore watershed and of these people, 8 were present at the March 10th meeting. To determine landowners along Iron Ore Creek and within the watershed,. At this meeting, the proposed RUAA sites based on road crossings were presented and efforts were made to solicit landowner access, particularly in the large gap between Fannin Avenue and Shannon Road (sites IO03 and IO04; see Figure Appendix A.6). Desvoignes Road passes about midway between Fannin Avenue and Shannon Road, but accessing the creek directly at this road crossing was not considered safe. Attempts to contact streamside landowners for access in this area of the creek were unsuccessful; therefore, no RUAA survey sites are currently selected between IO03 and IO04.

The average distance between survey sites is 1.74 river miles and ranges from 0.68 to 4.63 river miles. The largest gap between survey sites is 4.63 river miles between sites IO03 and IO04. There is no suitable public access to Iron Ore Creek without accessing private property which, as noted above, has not been granted.

The Iron Ore Creek watershed is located in the northern portion of the Choctaw Creek watershed and has two WWTFs discharging to tributaries for Iron Ore Creek (Table B1.5). There are also two concrete plants with general permits. Of note, the City of Denison in the northern part of the watershed has its WWTF discharge flow via a pipeline to the Red River. There are no CAFOs permitted within the Iron Ore Creek watershed.

Table B1.5. Iron Ore Creek (0202K) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ ID	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	IO01	Iron Ore Creek at Star road	33.706984	-96.473474	0.0	0.82	Public
	IO02	Iron Ore Creek at Hwy 69	33.701114	-96.490502	2.22	3.04	Public
	IO03	Iron Ore Creek at Shannon Rd (Tapscot in Google Earth)	33.694519	-96.505514	1.42	4.46	Public
	IO04	Iron Ore Creek at Fannin Ave	33.711877	-96.543617	4.63	9.09	Public
18653	IO05	Iron Ore Creek at North Texoma Parkway	33.717374	-96.560224	1.16	10.25	Public
	IO06	Iron Ore Creek at Park Avenue	33.717342	-96.569329	0.68	10.93	Public
	IO07	Iron Ore Creek at Hwy 75 Northbound Frontage Road	33.717661	-96.584783	1.39	12.32	Public
	IO08	Iron Ore Creek at Loy Lake Road	33.718291	-96.601092	1.14	13.46	Public
	IO09	Iron Ore Creek at Preston Rd	33.727279	-96.618798	1.57	15.03	Public
	IO10	Iron Ore Creek at Davy Ln	33.737145	-96.638322	1.77	16.81	Public
	IO11	Iron Ore Creek at Wells Rd/FM996	33.751812	-96.641830	1.36	18.16	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Kickapoo Creek in Henderson County (0605A) Kickapoo Creek in Henderson County (0605A) is 41 river miles long indicating a goal of 25 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.7). Nineteen sites were selected for the RUAA, 10 of which are publically accessible via road crossings and nine of which access is via private property (Table B1.6). Of the 10 publically accessible sites, three are identified as TCEQ sampling stations. No parks either public or private were identified along Kickapoo Creek. Of the private landowners contacted, one includes an animal rescue facility (the Cleveland Amory Black Beauty Ranch), which is operated by the Fund for Animals (<http://www.blackbeautyranh.org/about/>). The ranch is not open to regular public visitation, but according to its website, the ranch opens its gates twice a year for public tours. RUAA site KC09 is located on this animal rescue ranch (Figure Appendix A.7).

Access along Kickapoo Creek in Henderson County is largely via private property. Landowners throughout the watershed with river front property were contacted regarding access to Kickapoo Creek for potential RUAA sites. A public stakeholder meeting held on February 24, 2014 in Chandler, Texas. Of note, the public meeting held in Chandler also addressed proposed RUAA's in the Neches River above Lake Palestine. The meeting was advertised in local newspapers and through other appropriate media outlets such as the local radio channels. Mailings went out to 350 individuals within the Kickapoo Creek watershed and of these people, 18 attended the February 24th meeting. In addition during site reconnaissance trips, attempts were made to contact landowners directly, stopping by houses that appeared near the creek if a house was accessible (not gated and locked), as well as speaking with neighbors and nearby landowners.

The average distance between survey sites is 2.2 river miles and ranges from 0.63 to 5.0 miles. The largest gap of 5 river miles is between survey sites KC02 and KC03. There are no major or minor road crossings between these two sites and attempts to contact landowners for access permission have been unsuccessful, or access has been denied. Because Kickapoo is a very braided creek, RUAA survey sites KC02, KC03, KC06, and KC12 do not fall directly on the assessment unit (AU) line as defined by the TCEQ GIS layer. The locations of these sites were reviewed and approved by TSSWCB and TCEQ prior to finalizing them for the RUAA field surveys.

There are two municipal wastewater treatment facilities (WWTFs) within the Kickapoo Creek watershed, one for the City of Brownsboro and the other for the City of Murchison (Table B1.6). A third small WWTF, run by the RPM Water Supply Corporation, does not discharge directly into Kickapoo Creek but to Battle Creek, which merges with Kickapoo Creek in a braided fashion as part of Kickapoo Cove of Lake Palestine. Depending on flow conditions and patterns, Battle Creek may be considered a tributary of Kickapoo Creek or a separate Creek into Lake Palestine. The largest permitted discharge is the City of Brownsboro with a permitted average daily flow of 0.156 MGD. There is one concentrated animal feeding operation (CAFO) within the Kickapoo Creek watershed with a general permit. The Twin Lake Dairy (TXG920265) is located on the east side of FM 1861, about 1 mile south of its intersection with FM 858 in Van Zandt County (Figure Appendix A.7). The Twin Lake Dairy is permitted for 3,599 total daily cattle of which 2,880 are milking cows.

Table B1.6. Kickapoo Creek in Henderson County (0605A) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	KC01	Kickapoo Creek crossing at SH31	32.300024	-95.507758	0.0	0.06	Public
	KC02	Kickapoo Creek on private property approximately 720 meters south of Henderson CR3302 and 1.1 km west of Henderson CR3315	32.313740	-95.521041	2.10	2.16	Private
	KC03	Kickapoo Creek on private property approximately 1.8 km south of Henderson CR3302 and 5.8 km west of Henderson CR3315	32.315784	-95.570040	5.00	7.16	Private
10517	KC04	Kickapoo Creek crossing at FM314	32.309099	-95.605826	3.13	10.29	Public
	KC05	Kickapoo Creek crossing at Henderson CR3514	32.313294	-95.634427	2.60	12.89	Public
	KC06	Kickapoo Creek on private property approximately 1.3 km north of Henderson CR3516	32.312876	-95.647848	1.33	14.22	Private
	KC07	Kickapoo Creek crossing at Henderson CR3520	32.319250	-95.671307	2.82	17.04	Public
16796	KC08	Kickapoo Creek crossing at FM1803	32.312309	-95.705716	3.31	20.35	Public
	KC09	Kickapoo Creek on private property (Fund for Animals) approximately 1.5 km east of Henderson CR3806	32.303873	-95.720764	1.55	21.90	Private
	KC10	Kickapoo Creek crossing at Henderson CR3806	32.313565	-95.732693	2.08	23.98	Public
16797	KC11	Kickapoo Creek crossing at FM773	32.334668	-95.745165	3.24	27.22	Public
	KC12	Kickapoo Creek on private Property approximately 1.2 km west of FM773	32.339385	-95.758632	1.22	28.44	Private
	KC13	Kickapoo Creek on private Property approximately 2.0 km west of FM773	32.339670	-95.766563	0.63	29.07	Private
	KC14	Kickapoo Creek on private Property approximately 1.4 km south of Van Zandt CR4301	32.345898	-95.774142	1.12	30.19	Private
	KC15	Kickapoo Creek on private approximately 1.4 km southwest of Van Zandt CR4301	32.348719	-95.788403	2.08	32.27	Private
	KC16	Kickapoo Creek crossing at 1861	32.361167	-95.805017	2.05	34.32	Public

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	KC17	Kickapoo Creek on private property approximately 25 meters southwest of Deer Park Estates road	32.372709	-95.815739	1.25	35.57	Private
	KC18	Kickapoo Creek crossing at Van Zandt CR4206	32.385408	-95.826422	1.56	37.13	Public
	KC19	Creek crossing at FM858	32.416093	-95.828130	2.45	39.58	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

The Neches River above Lake Palestine (Segment 0606) The Neches River above Lake Palestine (Segment 0606) is 33 river miles long indicating a goal of 20 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.8). Public access to the Neches River above Lake Palestine is available by several road crossings. Eighteen sites were selected for the RUAA, nine of which are publically accessible via road crossings and nine of which are accessible via private property (Table B1.7). Private and public access to the Neches River above Lake Palestine is equally distributed among the proposed RUAA sites. Of the 18 proposed RUAA sites, five are associated with TCEQ sampling stations.

With regard to public sites, Segment 0606 flows through the River Park in the City of Chandler on Hwy 31. The River Park is located on the banks of the Neches River and provides a boat ramp for fisherman, a nature walk, and picnic areas. The City of Chandler has future plans to include a new boat ramp as well as a walk-way along the Neches River above Lake Palestine under Hwy 31. RUAA site NR02 is located within River Park (Figure Appendix A.8).

Landowners throughout the watershed with river front property were contacted regarding access to Neches River (0606) for potential RUAA sites. During site reconnaissance trips, attempts were made to contact landowners directly by stopping by houses that appeared near the river and knocking on doors, if a house was accessible (not behind a locked gate). Phone calls were also made to landowners living along or near the river. Overall, landowners within the watershed were very cooperative and friendly to TIAER personnel.

Public participation was also solicited at two public meetings held on February 20, 2014 in Tyler, Texas and February 24, 2014 in Chandler, Texas to discuss the upcoming RUAA survey. Mailings went out to 150 individuals within the watershed area and of these people, two attended the February 20th meeting and one attended the meeting on February 24th. Of note, both of these public meetings also focused on individuals within the watershed of Prairie Creek (0606A), which is a tributary to the Neches River above Lake Palestine representing a subwatershed of Segment 0606. The meeting held on February 20th also focused on individuals within the Mud Creek and West Mud Creek watersheds. The meeting on February 24th in Chandler also focused on the Kickapoo Creek RUAA. These meetings were advertised in local newspapers and through other appropriate media outlets such as local radio channels.

The average distance between survey sites is 1.80 river miles and ranges from 0.20 to 3.61 miles. The largest gap of 3.61 miles is between sites NR11 and NR12. The second largest gap of 3.31 river miles is between sites NR06 and NF07. There are no road crossings between these two gaps and although private landowners were very cooperative, TIAER was unable to access private lands within these areas along the river, although concerted efforts were made to contact landowners.

Because of braiding along the river, RUAA survey sites NR07 and NR08 do not fall directly on the assessment unit (AU) line as defined by the TCEQ GIS layer. The locations of these sites were reviewed and approved by TSSWCB and TCEQ prior to finalizing them for the RUAA field surveys.

With regard to permitted discharges within the Neches River above Lake Palestine watershed for Segment 0606, these also include all permitted discharges within the Prairie Creek watershed (see Table B1.6). The Prairie Creek watershed contains three WWTF discharges but also several permitted stormwater outfalls associated with Delek Refining. Excluding those outfalls in the Prairie Creek watershed, there are five permitted WWTFs within the Neches River above Lake Palestine watershed, none of which directly discharge to Segment 0606 (Table B1.6).

Table B1.7. The Neches River above Lake Palestine (Segment 0606) RUAA Sites. Sites are listed in downstream to upstream order along the segment.

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	NR01	Neches River on private property approximately 250 meters south of SH31	32.313151	-95.451144	0.0	0.76	Private
10595	NR02	Neches River at intersection with SH31	32.315093	-95.452393	0.20	0.96	Public
	NR03	Neches River on private property approximately 1.4 km North of SH 31	32.326158	-95.456693	1.09	2.05	Private
	NR04	Neches River on private property approximately 3.6 km north of SH 31 and 2.5 km west of SH 49	32.348680	-95.456751	2.34	4.39	Private
10596	NR05	Neches River at intersection with FM 279	32.364788	-95.452936	1.43	5.82	Public
10597	NR06	Neches River at intersection with SH 64	32.374025	-95.473591	2.44	8.26	Public
	NR07	Neches River on private property approximately 1.4 km east of Van Zandt CR 4923 and 3 km north of SH 64	32.404723	-95.504434	3.31	11.57	Private
	NR08	Neches River on private property approximately 1.2 km east of Van Zandt CR 4923 and 3.4 km north of SH 64	32.408613	-95.506397	0.29	11.86	Private
10598	NR09	Neches River at intersection with Van Zandt CR4915; Smith CR420	32.421333	-95.524882	2.85	14.71	Public
	NR10	Neches River at intersection with Van Zandt CR4931; Smith CR421	32.427673	-95.528349	0.84	15.55	Public
	NR11	Private Property approximately 1.3 km west of Smith CR 420	32.441093	-95.545139	1.69	17.24	Private
	NR12	Neches River at intersection with Van Zandt CR4908; Smith CR426; Willow Branch Rd	32.462036	-95.572039	3.61	20.85	Public
	NR13	Neches River at intersection with Van Zandt CR4912	32.471813	-95.595652	2.45	23.30	Public
	NR14	Neches River on private property approximately 340 meters north of Van Zandt County Road 4912	32.470571	-95.602380	0.56	23.86	Private
	NR15	Neches River on private property approximately 1.4 km south of Van Zandt CR 1995 and 2.2 km east of FM 314	32.484084	-95.617644	3.02	26.88	Private

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	NR16	Neches River at intersection with FM 314	32.491473	-95.643209	2.82	29.70	Public
	NR17	Neches River on private property approximately 620 meters south of FM 1995 and 850 meters west of FM 314	32.494288	-95.652186	0.89	30.59	Private
20282	NR18	Neches River at intersection with Van Zandt CR4511	32.490439	-95.663521	0.77	31.36	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 10 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Prairie Creek (0606A) Prairie Creek (0606A) is just under 12 river miles long, which indicates a goal of 7 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.9). TIAER was able to reach this goal of 7 sites via public road crossings (Table B1.8). Seven sites were selected for the RUAA, four of which are TCEQ stations. Because the RUAA goal could be met via publically accessible locations, efforts were not made to obtain separate private property sites along Prairie Creek. A concerted effort was made to contact landowners up and downstream of these public access points to make sure they would allow access to their land. This was done because although road crossings are public access points, private lands may need to be accessed to complete the full 300-m reach for each RUAA field survey. There are no city or public parks located along the mainstem of Prairie Creek. Only two road crossings along Prairie Creek were not selected as RUAA sites. These include the crossing of Interstate 20, because a safer location, site PC07 on CR 474, is just upstream; and Texas Toll Road Loop 49, which crosses between sites PC03 and PC02. Of note, Texas Toll Road Loop 49 does not show up on Figure A.9 as it is a very new road and is not included in the currently available TxDot Road GIS layer dated as of 2013. Texas Toll Road Loop 49 does show up when the watershed area is viewed using Google Maps.

Landowners throughout the watershed were notified of the proposed RUAA through a public meeting held on February 20, 2014 in Tyler, Texas. Mailings went out to 133 individuals within the watershed area and of these, 11 people attend the February 20th meeting. Of note, this public meeting also focused on individuals within the entire watershed of the Neches River above Lake Palestine (Segment 0606) of which Prairie Creek is a subwatershed, and the watersheds of Mud Creek (0611C) and West Mud Creek (0611D). These meetings were advertised in local newspapers and through other appropriate media outlets such as local radio channels.

The average distance between survey sites is 1.80 river miles and ranges from 1.11 to 2.42 miles. The largest gap between survey sites is 2.42 river miles between sites PC02 and PC03. The second largest gap is 1.72 river miles between sites 10520 and 18301. These gaps seemed reasonable given the RUAA goal, so additional efforts were not made to procure RUAA sites between these locations.

Within the Prairie Creek watershed are three permitted WWTFs and several permitted outflows for stormwater discharge (Table B1.8). The City of Tyler Westside WWTF is by far the largest discharger with a permitted flow of 13 MGD. As Prairie Creek (0606A) is a tributary of the Neches River above Lake Palestine, all discharges to Prairie Creek are also discharged to Segment 0606.

Table B1.8. Prairie Creek (606A) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
10518	PC01	Prairie Creek at intersection with SH 64	32.371761	-95.453573	0.0	0.46	Public
10519	PC02	Prairie Creek at intersection with FM 724	32.387410	-95.442177	1.78	2.24	Public
10520	PC03	Prairie Creek at intersection with Old New Harmony Rd	32.412369	-95.429435	2.42	4.66	Public
18301	PC04	Prairie Creek at intersection with SH110	32.432981	-95.410707	1.72	6.38	Public
	PC05	Prairie Creek at intersection with CR 471	32.448349	-95.409622	1.91	8.29	Public
	PC06	Prairie Creek at intersection with CR 472	32.469911	-95.400456	1.86	10.15	Public
	PC07	Prairie Creek at intersection with CR 474	32.483380	-95.402960	1.11	11.26	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

Mud Creek (0611C) Mud Creek (0611C) is just under 54 river miles long indicating a goal of 32 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.10). Twenty-one sites were selected for the RUAA, 11 of which are publically accessible via road crossings and 10 of which are accessible via private property (Table B1.9). The selected RUAA sites include seven existing TCEQ monitoring stations along the mainstem of Mud Creek (0611C).

Public access to Mud Creek is largely limited to road crossings. There are no publicly operated parks along Mud Creek. However, there is a private park; the Mud Creek Off-Road Park located off CR 4209 east of Jacksonville, Texas (<http://www.mudcreekoftoadpark.com/index.html>) that is open to the public. The Mud Creek Off-Road Park covers about 4,100 acres and is an ATV only park with 80 RV hookups for water and electricity and 35 RV hookups for water, electricity, and sewer. This ATV park hosts several events each year that bring hundreds of people to the area. The landowner for the Mud Creek Off-Road Park was contacted and gave permission for access for RUAA survey sites. RUAA sites MD10, MD11, and MD12 cover portions of Mud Creek associated with the Mud Creek Off-Road Park (Figure Appendix A.10).

With regard to other locations along Mud Creek, landowners throughout the watershed with creek front property were contacted regarding access to Mud Creek (0611C) for potential RUAA sites. During site reconnaissance trips, attempts were made to contact landowners directly by stopping at houses that appeared near the river, if a house was accessible (not behind a locked gate). Phone calls were also made to landowners who appeared to live along or near the creek. Public participation was also solicited at two public meetings held on February 20, 2014 in Tyler, Texas and February 25, 2014 in Rusk, Texas to discuss the upcoming RUAA survey. Mailings went out to 182 individuals within the watershed area; of these, 7 people attended the February 20th meeting and 7 people attended the meeting on February 25th. Of note, there were some individuals who did not feel the need to attend the public meeting after speaking with the field supervisor about allowing access on private property. The public meeting in Tyler also focused on individuals within the watersheds of Prairie Creek (0606A), the Neches River above Lake Palestine (Segment 0606), and West Mud Creek (0611D), which is a subwatershed of Mud Creek. The meeting on February 25th in Rusk focused on individuals within the Mud Creek (0611C) and West Mud Creek (0611D) watersheds. These meetings were advertised in local newspapers and on local radio stations.

While an intensive effort has been made to contact landowners to obtain the desired spacing and number of RUAA sites, some fairly large gaps exist between survey sites. The average distance between survey sites is 2.45 river miles but ranges from 7.23 to 0.50 miles. The largest gap between survey sites is 7.23 river miles between sites MD05 and MD06 along the lower third of the creek (Appendix A.10). Because Mud Creek is very braided, RUAA survey sites MD01, MD02, MD07, MD09, and MD12 do not fall directly on the assessment unit (AU) line as defined by the TCEQ GIS layer. The locations of these sites were reviewed and approved by TSSWCB and TCEQ prior to finalizing them for the RUAA field surveys.

Three landowners with notable property holdings bordering Mud Creek between sites MD05 and MD06 were contacted and all three denied access. There is no suitable public access to Mud Creek (0611C) between sites MD05 and MD06, even when minor roads were checked. For other areas

with fairly large gaps, TIAER has made phone calls and also driven up all roads (major and minor) knocking on doors of houses near the creek that could be accessed (i.e., were not behind a locked gate) in an attempt to contact landowners. Despite these intensive efforts, access to the creek in these areas has either been denied or direct voice or face-to-face contact with the landowner could not be made to obtain the needed permissions.

Table B1.9. Mud Creek (0611C) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous site (mi) ¹	Distance from Confluence(mi) ¹	Access
	MD01	Mud Creek on private property approximately 4.3 km south of Highway 84	31.820916	-94.982989	0.0	2.16	Private
	MD02	Mud Creek on private property approximately 3.7 km south of Highway 84	31.827724	-94.980324	0.50	2.66	Private
	MD03	Mud Creek on private property approximately 2.5 km south of Highway 84	31.837863	-94.979123	1.07	3.73	Private
10532	MD04	Mud Creek crossing SH 84	31.856100	-94.996248	1.90	5.63	Public
	MD05	Mud Creek on private property approximately 2.2 km north of Highway 84	31.866965	-95.018537	1.64	7.27	Private
	MD06	Mud Creek crossing CR 1301	31.878245	-95.071563	7.23	14.50	Public
	MD07	Mud Creek crossing FM 110	31.887333	-95.087438	1.49	15.99	Public
	MD08	Mud Creek crossing SH 204	31.900987	-95.097038	1.56	17.55	Public
	MD09	Mud Creek on private property approximately 1.9 km north of Highway 204	31.929423	-95.131729	3.44	20.99	Private
	MD10	Mud Creek on private property approximately 450 meters south of Highway 79	31.973525	-95.152809	5.87	26.86	Private
14477	MD11	Mud Creek crossing SH 79	31.976895	-95.160566	0.81	27.67	Public
	MD12	Mud Creek along the powerline right of way on private property approximately 760 meters North of SH 79	31.982668	-95.167659	0.63	28.30	Private
14477	MD13	Mud Creek crossing CR 4223	32.020911	-95.162730	5.31	33.61	Public
14477	MD14	Mud Creek crossing FM 2064	32.027296	-95.170207	0.77	34.38	Public
	MD15	Mud Creek on private property approximately 1.3 km south of Cherokee County Road 4905	32.052076	-95.171736	5.01	39.39	Private
	MD16	Mud Creek crossing CR 4905	32.063672	-95.170959	1.24	40.63	Public
	MD17	Mud Creek on private property approximately 3.2 km East of SH 135	32.078190	-95.177492	1.83	42.46	Private
17103	MD18	Mud Creek crossing SH 135	32.102921	-95.170332	2.38	44.84	Public
	MD19	Mud Creek on private property approximately 1.0 km North of SH 135	32.113126	-95.163117	1.20	46.04	Private

TCEQ Station	Site ID	Site Description	Latitude	Longitude	Distance from Previous site (mi)¹	Distance from Confluence(mi)¹	Access
10537	MD20	Mud Creek crossing CR 2138	32.152908	-95.174308	4.03	50.07	Public
16586	MD21	Mud Creek crossing SH 110	32.162091	-95.171159	1.05	51.12	Public

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

West Mud Creek (0611D) West Mud Creek (0611D) is just at 23 river miles long, which indicates a goal of 14 sites (3 sites per 5 miles of river) for the RUAA survey (Figure Appendix A.11). There are 12 sites selected for the RUAA, 8 of which are publically accessible via road crossings and 4 of which are accessible via private property (Table B1.10). Of the eight publically accessible sites, five are recognized TCEQ sampling stations.

In addition to the eight road crossings, West Mud Creek flows through a small portion of Faulkner Park within the City of Tyler. Faulkner Park is located off Cumberland Road in Tyler and provides picnic areas, baseball/softball fields, tennis courts, a children's playground, a fishing pond and a nature trail. The fishing pond is within the interior of the park and is not in association with West Mud Creek. The park intersects with West Mud Creek only in a small portion along its western most border near the park's nature trail. Based on reviews of this trail (see <http://alltrails.com/trail/us/texas/faulkner-park-trail>), this trail is primarily used for mountain biking, and although the creek is noted as a feature, the trail does not cross the creek. The closest portion of this trail to West Mud Creek is several hundred feet through dense trees and brush, which would make the creek difficult to access by the public. Because the creek is not readily accessible from the trail and because another RUAA survey site is within 2,000 ft of the park location at CR 2813 (site WM10), an RUAA site is not selected within Faulkner Park.

West Mud Creek also borders portions of the Hollytree Country Club within the City of Tyler. TIAER was granted permission to access West Mud Creek from Hollytree Country Club and proposed RUAA site WM11 is through this private property (Table B1.10 and Figure Appendix A.11). Hollytree Country Club is a private club and requires membership. It has an 18-hole golf course that in part borders West Mud Creek. While the Hollytree Country Club offers other amenities, such as tennis, swimming and dining, none of these activities are conducted in association with the creek. Of note, the Hollytree Country Club borders the west side of the creek. There are residential homes on the east side of the creek in this area that could also potentially allow public access to the creek.

With regard to other locations along West Mud Creek, landowners throughout the watershed with creek front property were contacted regarding access to West Mud Creek (0611D) for potential RUAA sites. During site reconnaissance trips, attempts were made to contact landowners directly by stopping at houses that appeared near the river, if a house was accessible (not behind a locked gate). Phone calls were also made to landowners determined to live along or near the creek. Public participation was also solicited at two public meetings held on February 20, 2014 in Tyler, Texas and February 25, 2014 in Rusk, Texas to discuss the upcoming RUAA survey. Mailings went out to 190 individuals within the watershed area and of these, 2 people attend the February 20th meeting and 3 people attended the meeting on February 25th. Of note, the public meeting in Tyler also focused on individuals within the watersheds of Prairie Creek (0606A), the Neches River above Lake Palestine (0606), and Mud Creek (0611C) of which West Mud Creek is a tributary. The public meeting on February 25th in Rusk focused on individuals within the West Mud Creek (0611D) and Mud Creek (0611C) watersheds. These meetings were advertised in local newspapers and local radio stations. Despite thorough advertisement, some individuals that lived along West Mud Creek did not attend the public meetings after learning of the RUAA project from the project coordinator and/or field

supervisor. In addition to site WM11 on the Hollytree Country Club, three other RUAA sites are located off of private property.

Because West Mud Creek is very braided, RUAA survey site WM05 did not fall directly on the assessment unit (AU) line as defined by the TCEQ GIS layer. The location of site WM05 was reviewed and approved by TSSWCB and TCEQ prior to finalizing them for the RUAA field surveys.

Table B1.10. West Mud Creek (0611D) RUAA Sites. Sites are listed in downstream to upstream order along the water body.

TCEQ Station	Site ID	Site Descriptions	Latitude	Longitude	Distance from Previous Site (mi) ¹	Distance from Confluence (mi) ¹	Access
	WM01	West Mud Creek on private property approximately 2.1 km north of SH 135 and 2.1 km east of Cherokee CR3052	32.117973	-95.185575	0.0	1.96	Private
	WM02	West Mud Creek on private property approximately 2.3 km north of SH135 and 1.5 km east of Cherokee CR3052	32.116472	-95.193437	0.78	2.74	Private
10538	WM03	West Mud Creek crossing at FM3052	32.121359	-95.207115	1.16	3.9	Public
	WM04	West Mud Creek crossing at County Line Road on Cherokee/Smith County Line	32.136688	-95.229016	2.50	6.4	Public
	WM05	West Mud Creek on private property approximately 2.2 km west of Smith CR 2181	32.145149	-95.2386	0.98	7.38	Private
10539	WM06	West Mud Creek crossing at FM 344 5.8 KM northeast of Bullard	32.166134	-95.267905	3.1	10.48	Public
	WM07	West Mud Creek crossing at Smith CR 129	32.187911	-95.305965	3.55	14.03	Public
10540	WM08	West Mud Creek crossing FM 346 4.2 miles south of Tyler	32.207414	-95.311517	1.56	15.59	Public
18302	WM09	West Mud Creek crossing US 69 4 miles south of Tyler	32.214147	-95.31548	0.62	16.21	Public
10541	WM10	West Mud Creek crossing at FM 2813 south of Tyler	32.239186	-95.323814	2.21	18.42	Public
	WM11	West Mud Creek on private property in Tyler approximately 740 km south of West Grande Blvd	32.273255	-95.315474	2.98	21.4	Private
	WM12	West Mud Creek at intersection of SH69 and Grande Blvd in Tyler	32.28005	-95.305941	0.7	22.1	Private

¹ Distances were digitally estimated using the measuring tool in ArcGIS 9.3 with the 2010 NAIP 1m DOQQs and the NHD stream layer as reference guides.

B2 Sampling Methods

Field Sampling Procedures

The sampling process design will be based on the *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014). For the RUAA field surveys, information to be collected shall at least satisfy those questions found on the Field Data Sheet from the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014) in Appendix B. The RUAA surveys shall be conducted during a normal warm season (air temperature greater than or equal to 70°F) during dry weather flows that are not storm influence and performed during the period when people would be most likely to use the water body for contact recreational purposes (examples: Saturdays & Sundays, holidays, and summer). In Texas, this period is typically May to September.

The RUAA survey field data sheets must be completed for each site. All field data gathered must be recorded in the appropriate locations on the field data sheets. Field data sheets may be recorded in indelible ink (preferred) or pencil with no erasures, modifications, write-overs or multi-line crossouts.

Documentation of Field Sampling Activities

Field sampling activities will be documented on the Field Data Sheets (see Appendix B). For all visits, stream name, site, date, time, and sample name of collector(s) shall be recorded. Values for all required field parameters will be recorded including detailed observational data as required on the RUAA Field Data Sheets. Data may be transferred to electronic Field Data Sheets from the hard copies for storage and improved legibility, but the original maintained.

Recording Data

For the purposes of this section and subsequent sections, all personnel follow the basic rules for recording information as documented below:

1. Legible writing in indelible, waterproof ink with no modifications, write-over's or cross-outs;
2. Changes should be made by crossing out original entries with a single line, entering the changes, and initialing and dating the corrections.
3. Close-outs on incomplete pages with an initialed and dated diagonal line.

Deficiencies, Nonconformances and Corrective Action Related to Sampling Requirements

Deficiencies are defined as unauthorized deviation from procedures documented in the QAPP. Nonconformances are deficiencies which affect quality and render the data unacceptable or indeterminate. Deficiencies related to sampling method requirements include, but are not limited to, such things as sample site adjustments.

Deficiencies are documented in logbooks, field data sheets, etc. by field staff and reported to the TIAER Field Operations Manager who will notify the appropriate TIAER Project Coordinator. The TIAER Project Coordinator in consultation with the TIAER Project QAO and TIAER PM

will determine if the deficiency constitutes a nonconformance. If it is determined the activity or item in question does not affect data quality and therefore is not a valid nonconformance, the deficiency worksheet will be completed accordingly. If it is determined a nonconformance does exist, the TIAER Project QAO in consultation with TIAER PM will determine the disposition of the nonconforming activity or item and necessary corrective action(s); results will be documented by completion of a CAR (Appendix D).

CARs document: root cause(s); programmatic impact(s); specific corrective action(s) to address the deficiency; action(s) to prevent recurrence; individual(s) responsible for each action; the timetable for completion of each action; and, the means by which completion of each corrective action will be documented. CARs will be included with quarterly progress reports. In addition, significant conditions (i.e., situations which, if uncorrected, could have a serious effect on safety or on the validity or integrity of data) will be reported to the TSSWCB immediately both verbally and in writing.

B3 Sample Handling and Custody

Sample Handling

Sample parameters for this project are recorded *in situ*. No physical samples are collected, so this section is not applicable.

B4 Analytical Methods

Failures in Measurement Systems and Corrective Actions

Failures in field measurement systems involve, but are not limited to, such things as instrument malfunctions. In many cases, the field technician will be able to correct the problem. If the problem is resolvable by the field technician, then they will document the problem on the field data sheet and complete the measurement. If the problem is not resolvable, then it is conveyed to the TIAER Project QAO through initiation of a CAR. The nature and disposition of the problem is reported to the TIAER PM, who will include this information in the CAR and submit with the QPR which is sent to the TSSWCB PM.

B5 Quality Control

Sample data for this project are recorded *in situ*. No physical samples are collected, so this section is not applicable.

B6 Instrument/Equipment Testing, Inspection and Maintenance

Field equipment is inspected and tested by TIAER upon receipt to assure it is appropriate for use. No specific equipment is required by this project to conduct the RUAA field surveys.

B7 Instrument/Equipment Calibration and Frequency

Sample data collected for this project do not require any instruments or equipment requiring calibration, so this section is not applicable.

B8 Inspection/Acceptance of Supplies and Consumables

All new batches of field supplies are inspected before use to ensure that they are adequate for the intended purpose. Extra supplies, such as camera for taking pictures during the RUAA field surveys, will be kept and made available to the project by the Field Supervisors.

B9 Non-direct Measurements

Information generated from the following tasks, which are included in the overall project contract, may be used to identify sites for RUAA data collection:

- A comprehensive GIS inventory of the study area.
- Reconnaissance trip(s) to assess potential survey sites.
- Public meetings for solicitation of landowner permission for access to survey sites.
- Historical information review of recreational uses of the water body since November 1975.

Comprehensive GIS Inventory

As part of the project for site selection and source identification, a comprehensive GIS survey will be compiled for the study area. All data to be used in the GIS survey for this project have been collected in accordance with approved QA measures under the TCEQ, Texas Water Development Board, USDA, and USGS. GIS data to be used include, but are not limited to, SSURGO and CBMS soils data, USGS NLCD and NHD, Census data (2000), Census of Agriculture data from USDA NASS (2007), and the United States Geological Survey (USGS) 30-meter resolution DEM (Table B9.1). Depending on the accessibility to the GIS layers from different data sources, efforts will be made to update the spatial data to the most recently available data. Also, as other relevant data sources become known, they may be added to the GIS Inventory.

As part of the project, TIAER will conduct a historical data review for each water body in order to assess and characterize trends and variability specifically of bacteria, but may also include other water quality parameters. The historical data collection activities will focus on ambient water quality data and may include streamflow and water level data, precipitation records, and data from permitted facilities including discharges and effluent quality. Data sources may include the USGS, National Weather Service, Texas Parks and Wildlife Department, Texas Water Development Board, Groundwater Conservation Districts, relevant River Authorities, TCEQ, and the EPA.

As part of the field RUAA surveys, historical weather data, specifically weather day for the 30 days prior to each field RUAA survey, will be obtained from the National Weather Service or other reliable source.

Because most non-direct data are of known and acceptable quality and were collected and analyzed in a manner comparable and consistent with needs for this project, no limitations will be placed on their use, except where known deviations have occurred.

Table B9.1 Non-Direct (Acquired) Data Required for Site Selection and Characterization of each Watershed

Data Type	Data Source	Applicable Date or Other Attributes	Use/Relevance
Aerial photography	USDA Farm Service Agency NAIP	2004-2010	Site Selection and landscape characteristics
Routine ambient water quality data: primarily bacteria, but also other parameters deemed relevant to a particular water body	TCEQ website in SWQMIS and/or associated River Authority	Full historical data range (1970s – present)	Background information on water quality and trends
DEMs 10-m resolution; GIS data	EPA-BASINS website preferred; webGIS, USGS National Seamless Server and GeoCommunity websites as alternatives. [Large data volume.]	N/A	Delineation of watershed boundaries and boundaries of assessment units
Agricultural census data	USDA NASS website	County level agricultural statistics (2007 data)	Potential sources
Soils data; GIS data (SSURGO)	NRCS website; SSURGO databases [Large data volume]	SSURGO is the most detailed soil maps developed by NRCS	Landscape characteristics
Daily streamflow, if available	USGS web site. [Large data volume.]	Streamflow 1970s to present	Flow characteristics
Municipal & Industrial WWTF permits	TCEQ	TPDES/NPDES permit	Location and type of discharges to each water body
Municipal & Industrial WWTF data (monthly discharged flow and any pertinent quality data associated with discharges)	TCEQ Information Resources Division data and EPA ECHO website (EPA ICIS-NPDES). [Small data volume. DMR provided by permit holders.]	Limited DMR data available from EPA website; more complete records from TCEQ; preferred data range 1970s to present	Flow characteristics and potential sources
Miscellaneous	TNRIS; North Carolina	N/A	Location of

Data Type	Data Source	Applicable Date or Other Attributes	Use/Relevance
geographic data (roads, streams, boundaries, etc.) [Required for physical presentation of maps in reports, largely not needed for modeling.]	State Univ. Libraries geospatial data services website; USGS NHD; U.S. Census Bureau website; Montana State University Geographic Locator website. [Large data volume.]		potential recreational areas along each water body (road crossings, parks, etc) and general watershed characteristics
Precipitation and air temperature data	National Weather Service	Historical for evaluation of normal conditions and for RUAA surveys daily data 30 days prior and during each field survey	Characterization of historical conditions and antecedent and current conditions associated with RUAA field surveys

B10 Data Management

TIAER will collect, store electronically, and make all collected project data available to the TSSWCB PM. TIAER will also be responsible for maintaining backup files to protect the data. Data will be stored, managed and submitted to TSSWCB through the TIAER PM. RUAA data will not go into TCEQ's SWQMIS database. The data will be accompanied by other deliverables, such as a final RUAA report. Deliverables will be submitted to the TSSWCB as described in the contract.

TIAER recordkeeping and document control procedures are contained in the TIAER Standard Operating Procedures (SOPs) for monitoring staff. Original field data sheets are stored in the main office of the TIAER Field Staff.

TIAER will complete Field Data Sheets for the Basic RUAA, Contact Information Forms, and Comprehensive RUAA Interview Forms by hand on hard copies. Information on the forms will be entered into electronic versions at the TIAER office in a directory specifically designated for the project that is backed up incrementally every evening and completely once a week. A TIAER staff member other than the person who electronically entered the data will review at least 10 percent of the survey information in the database against the original hard copies. TIAER staff members will enter data electronically onto the RUAA Summary Sheet into the project directory. Photographs will be taken according to guidelines in the Procedures for a Comprehensive RUAA and a Basic RUAA Survey. The photographs will be taken by an electronic camera and stored in a jpg format in the project directory.

Hardware and Software Requirements

Hardware configurations are sufficient to run Microsoft Access under the Windows Server operating system in a networked environment. Information resources staff is responsible for assuring hardware configurations meet the requirements for running current and future data management/database software as well as providing technical support. Software development and database administration are also the responsibility of the information resources department. Information resources develop applications based on user requests and assure full system compatibility prior to implementation.

C1 Assessments and Response Actions

Table C1.1 Assessments and Response Actions

Assessment Activity	Approximate Schedule	Responsible Party	Scope	Response Requirements
Status Monitoring Oversight, etc.	Continuous	TIAER PM and Coordinators	Monitoring of the project status and records to ensure requirements are being fulfilled.	Report to TSSWCB in QPRs
Monitoring Systems Audit	At least once per life of the project; dates to be determined by TSSWCB	TSSWCB QAO	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field measurement; facility review; and data management as they relate to the project	30 days to respond in writing to the TSSWCB to address corrective actions
Monitoring Systems Audit	Based on work plan and/or discretion of TIAER	TIAER Project QAO	The assessment will be tailored in accordance with objectives needed to assure compliance with the QAPP. Field measurement; facility review; and data management as they relate to the project	30 days to respond in writing to the TIAER Project QAO to address corrective actions
Site Visit	At least once per fiscal year; dates to be determined by TSSWCB	TSSWCB PM and Coordinators	Status of activities. Overall compliance with work plan and QAPP	As needed

Corrective Action

The TIAER Project QAO is responsible for implementing and tracking corrective action procedures as a result of audit findings. Records of audit findings and corrective actions are maintained by both the TSSWCB PM and the TIAER Project QAO.

Corrective action documentation will be submitted to the TSSWCB PM with the QPR. If audit findings and corrective actions cannot be resolved, then the authority and responsibility for terminating work is specified in agreements or contracts between participating organizations.

C2 Reports to Management

Reports to TSSWCB Project Management

All reports detailed in this section are contract deliverables that will be transferred from TIAER and to TSSWCB in accordance with contract requirements.

Quarterly Progress Report – Summarizes TIAER activities for each task; reports problems, delays, and corrective actions; and outlines the status of each task's deliverables.

Technical Report – Summarizes TIAER activities for the entire project period including a description and documentation of major project activities; evaluation of the project results and environmental benefits. Technical Report shall at least include those contents described for a Comprehensive RUAA in the TCEQ *Procedures for a Comprehensive RUAA and a Basic RUAA Survey* (March 2014).

- Electronic copies of completed interview forms, field data sheets, flow sheets, and RUAA summary sheet;
- Digital photographic record, cataloged for appropriate identification
- Individual Technical Reports summarizing historical information review, field surveys, and user interviews with water bodies grouped by Basin.

Reports to TIAER Project Management

Progress on project deliverables and any problems or issues concerning project activities are noted in routine staff meetings conducted by the TIAER PM with the Project Coordinators. CARs are the primary mechanism for communicating significant QA issues to management.

D1 Data Review, Verification, and Validation

The TIAER Project Coordinators will review data collected during each RUAA survey for completeness and accuracy as described in Section D2.

D2 Verification and Validation Methods

The TIAER Project Coordinators are responsible for reviewing surveys for completeness and accuracy. At least 10% of survey data in electronic RUAA field data sheets and interview forms should be verified for accuracy against the original handwritten values in field notebooks, field data sheets and interview forms.

D3 Reconciliation with User Requirements

The overall goal of the project is to collect data that provide stakeholders and agencies with sufficient information to determine recreational use status for the 10 creeks addressed in this project.

Appendix A: Area Location and RUAA Station Maps by Watershed

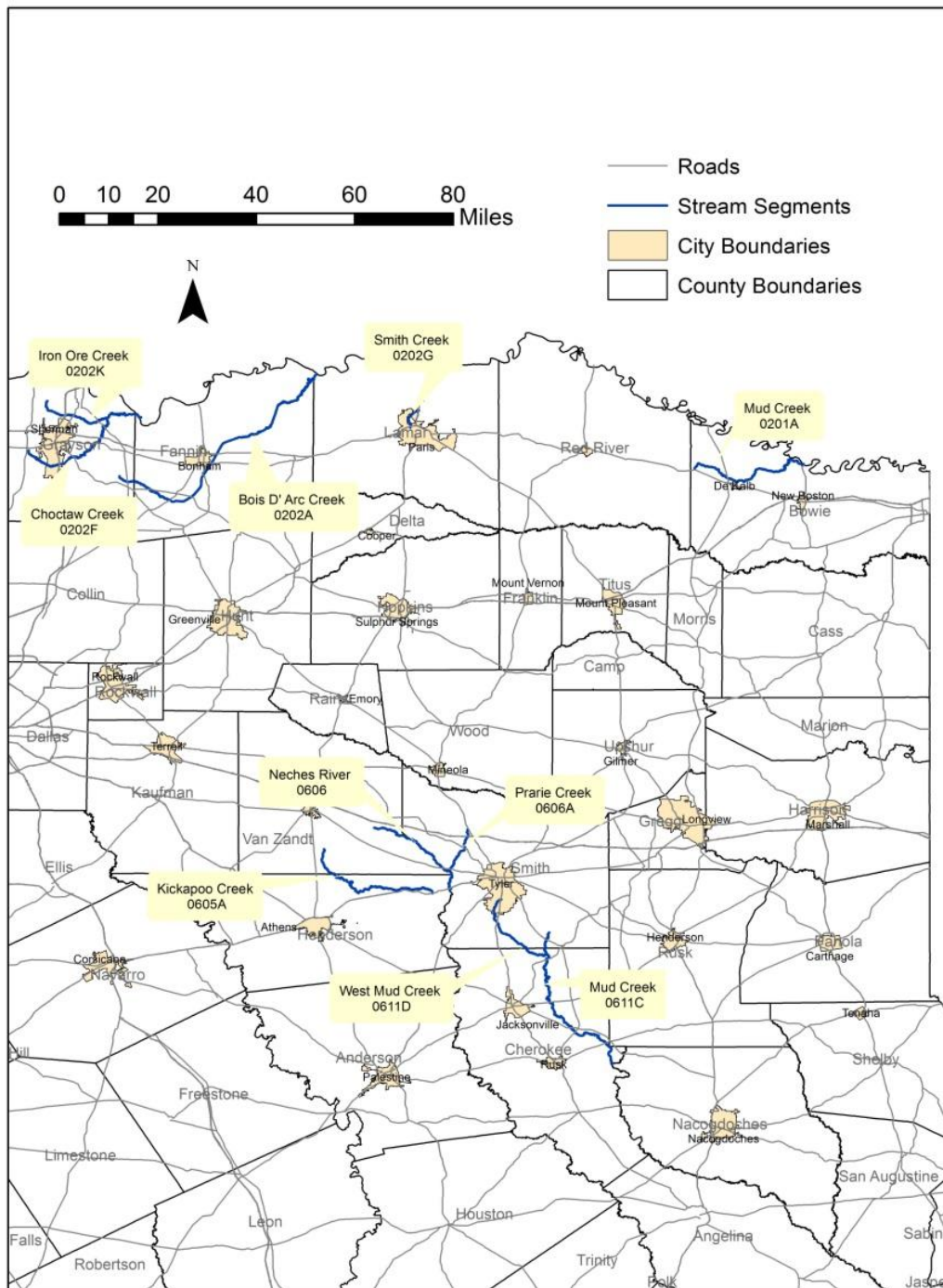


Figure Appendix A.1. Area location map for RUAA watersheds.

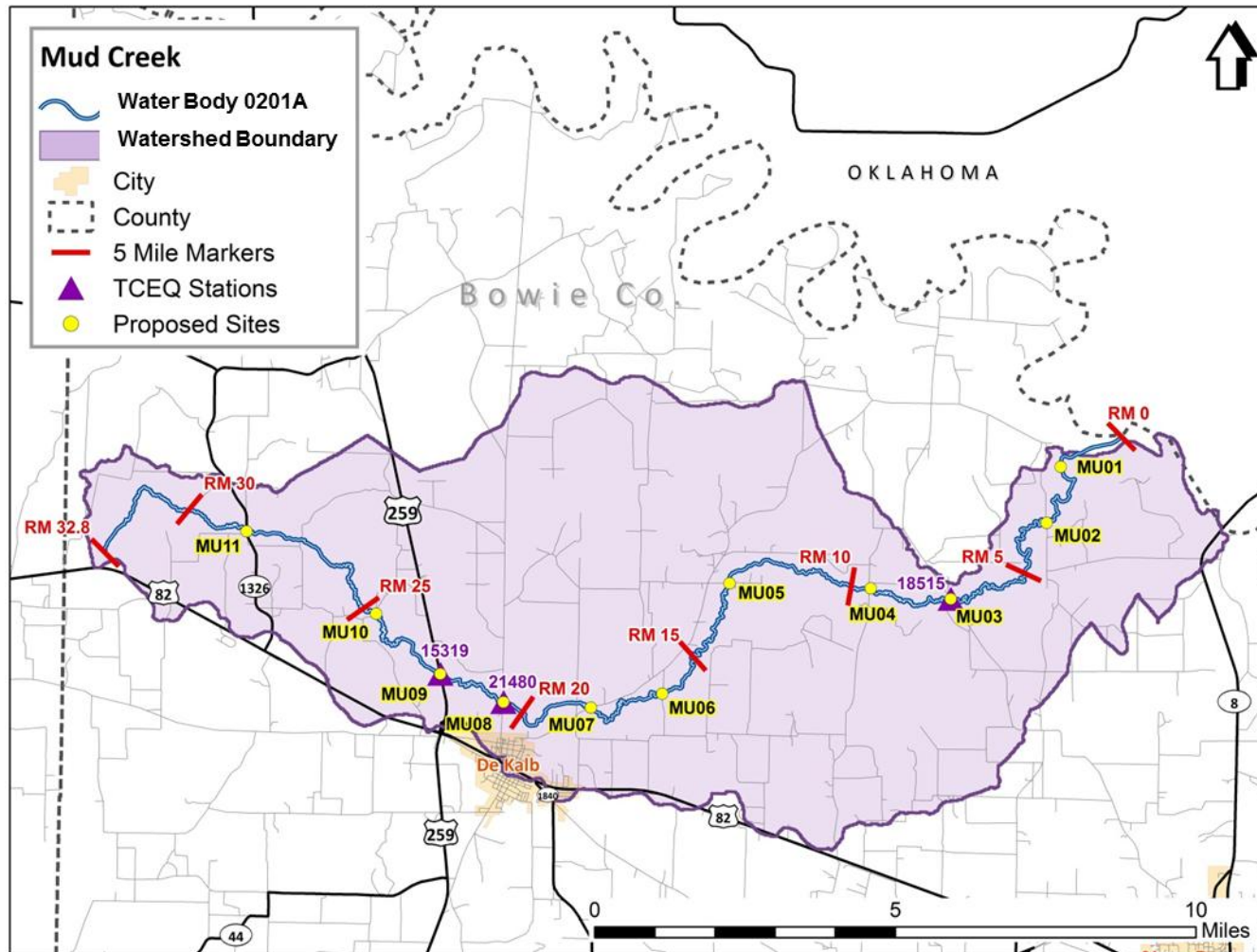


Figure Appendix A.2. RUAA survey sites for Mud Creek (0201A). RUAA sites corresponds to site descriptions in Table B1.1.

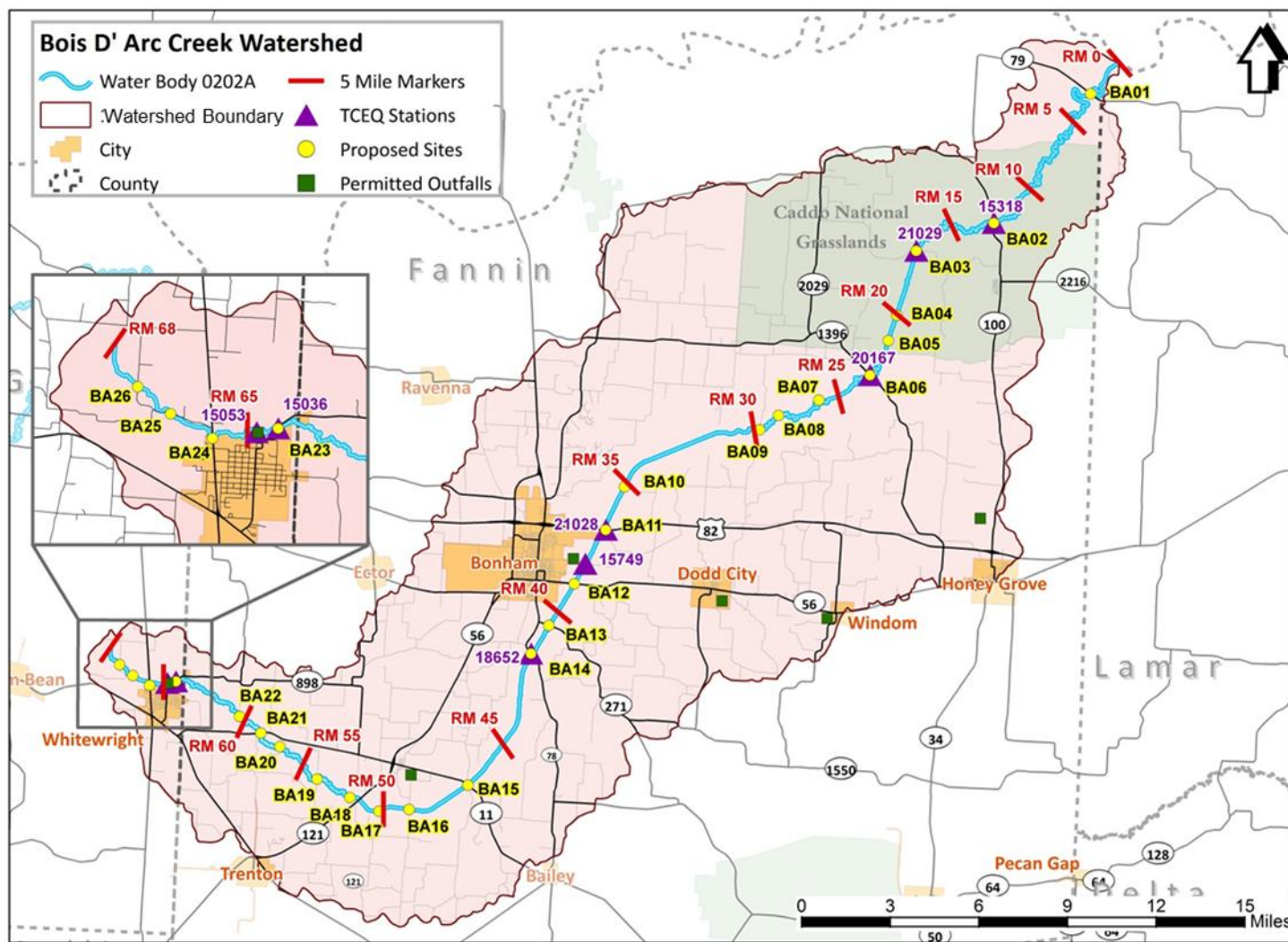


Figure Appendix A.3. RUAA survey sites for Bois D' Arc Creek (0202A). RUAA sites corresponds to site descriptions in Table B1.2.

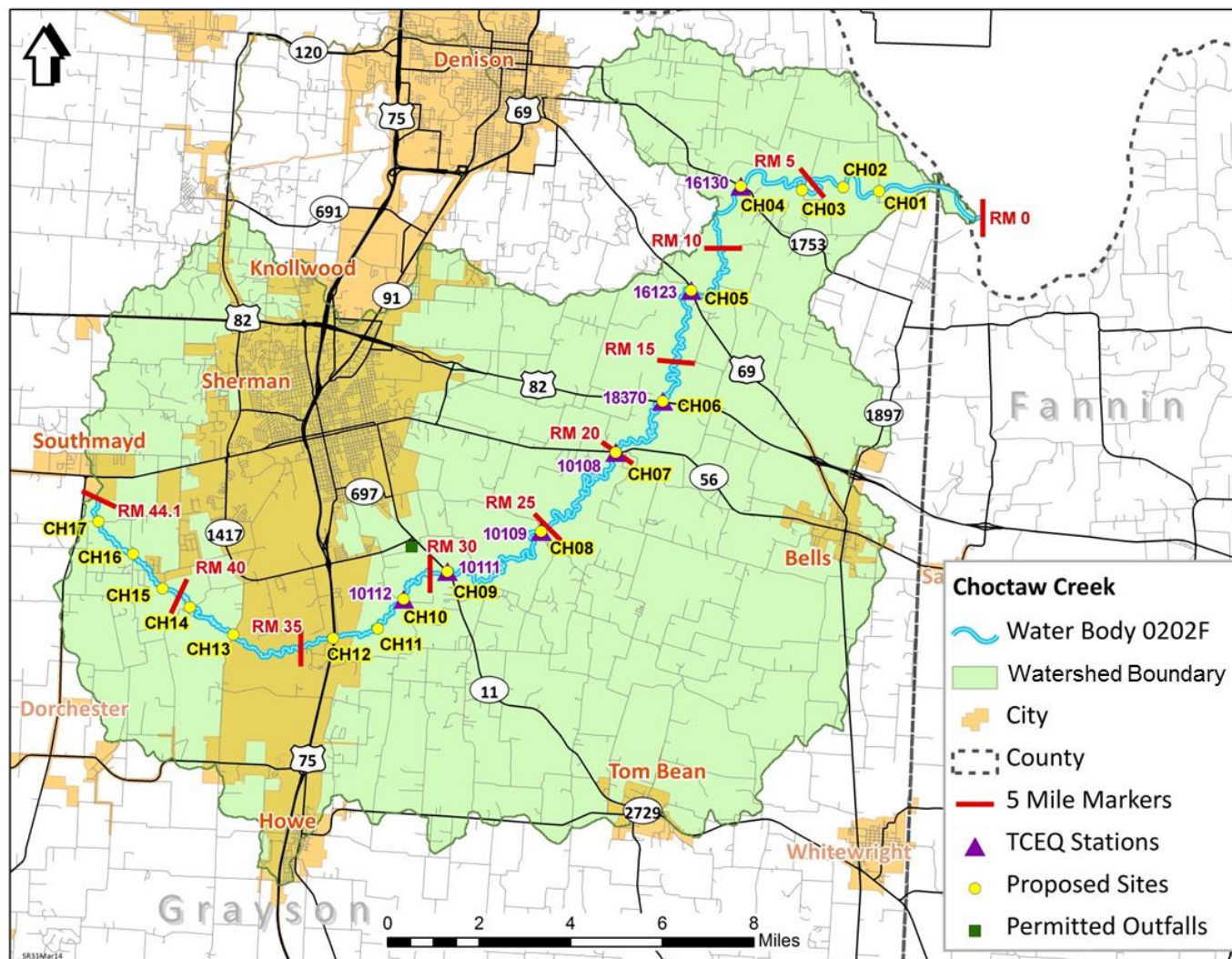


Figure Appendix A.4. RUAA survey sites for Choctaw Creek (0202F). RUAA sites corresponds to site descriptions in Table B1.3.

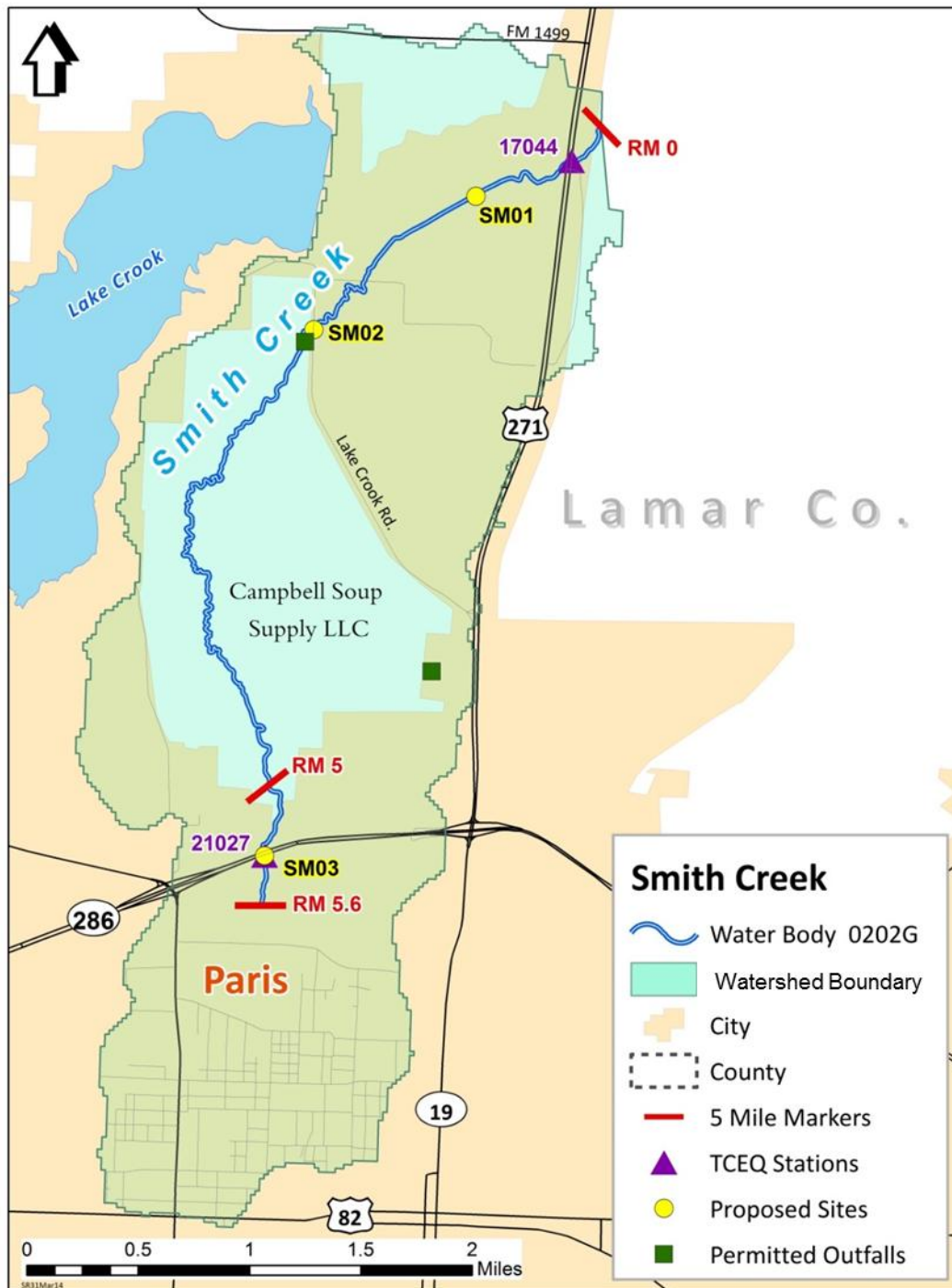


Figure Appendix A.5. RUAA survey sites for Smith Creek (0202G). RUAA sites corresponds to site descriptions in Table B1.4.

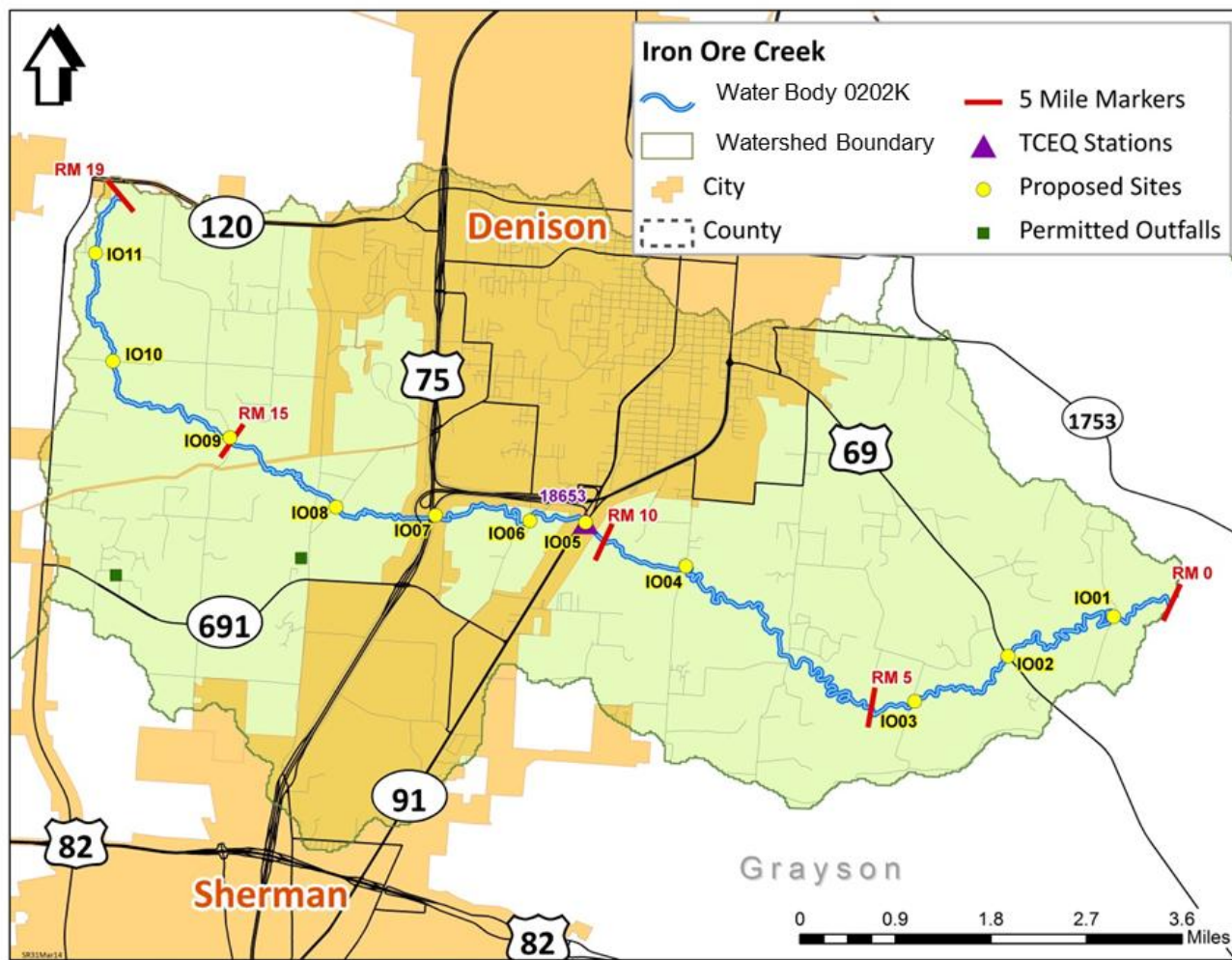


Figure Appendix A.6. RUAA survey sites for Iron Ore Creek (0202K). RUAA sites corresponds to site descriptions in Table B1.5.

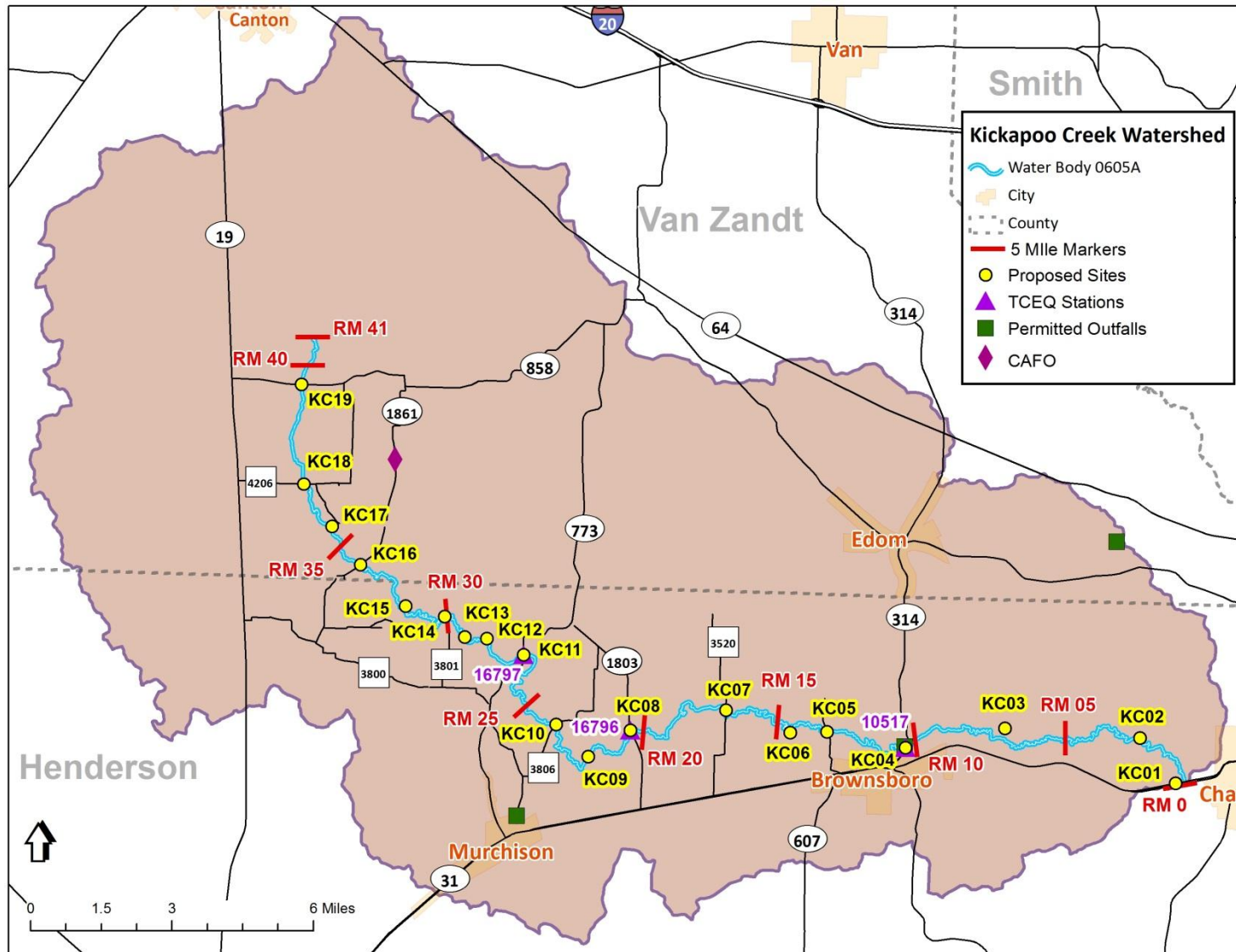


Figure Appendix A.7. RUAA survey sites for Kickapoo Creek in Henderson County (0605A). RUAA sites corresponds to site descriptions in Table B1.6.

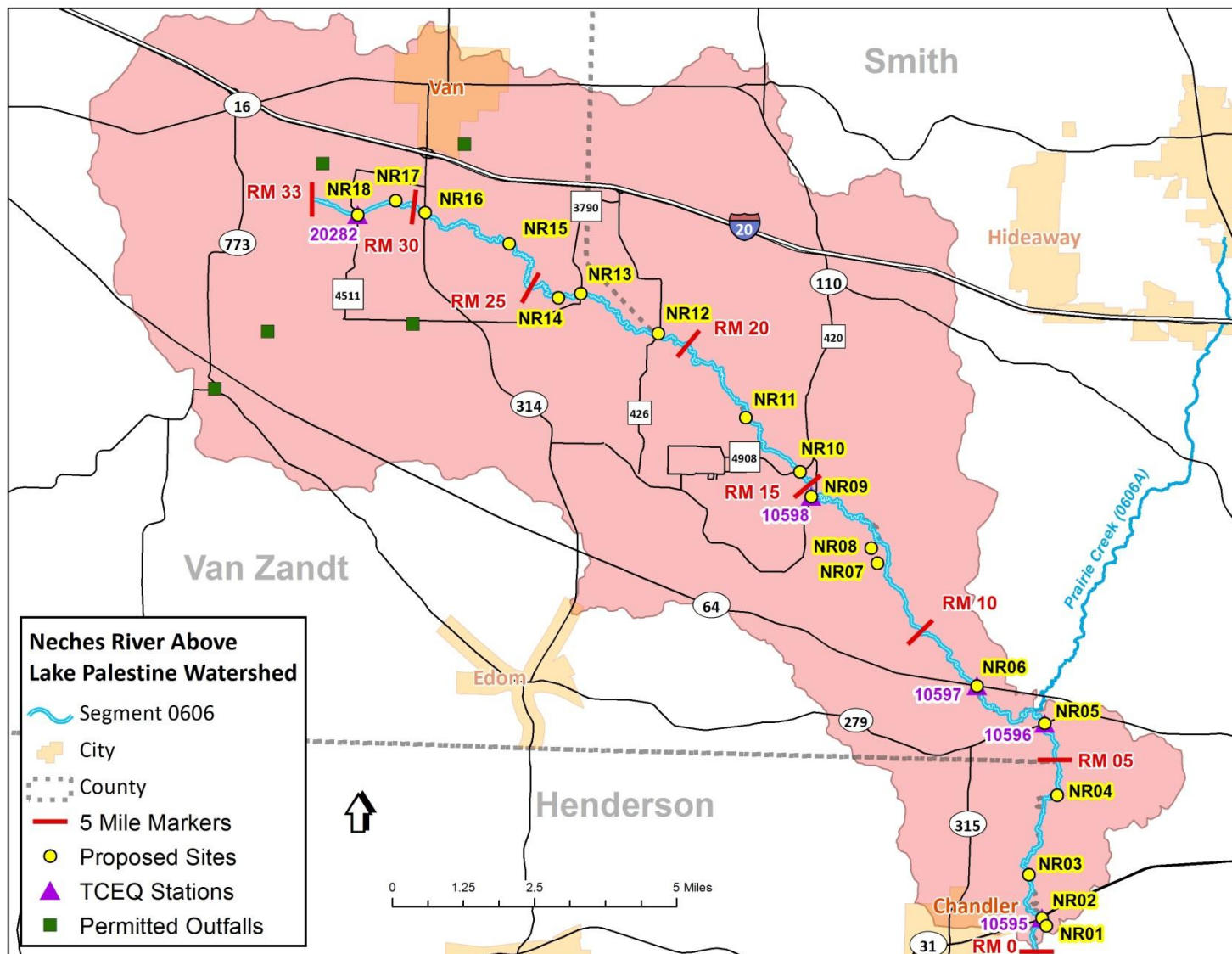


Figure Appendix A.8. RUAA survey sites for the Neches River Above Lake Palestine (Segment 0606). RUAA sites corresponds to site descriptions in Table B1.7.

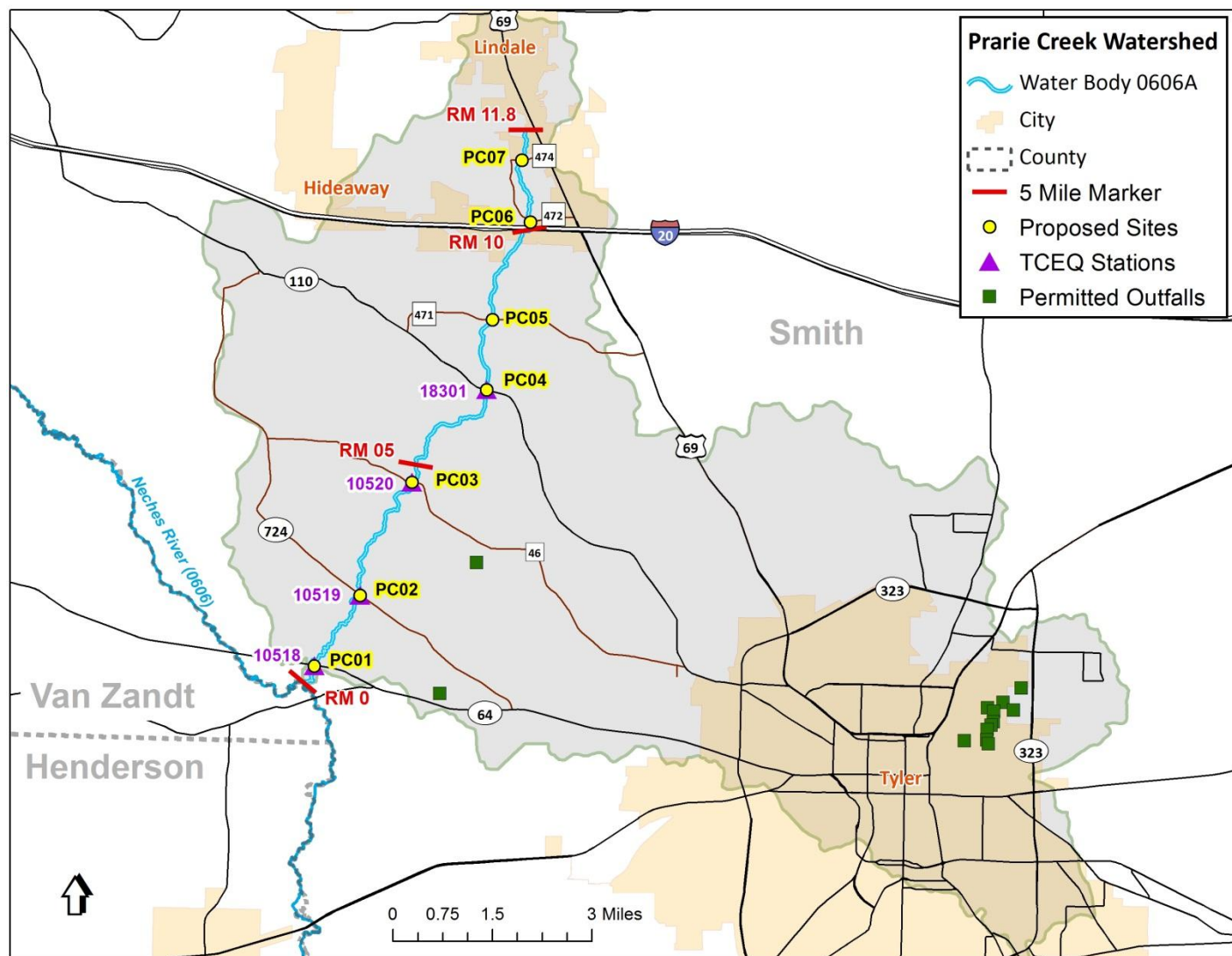


Figure Appendix A.9. RUAA survey sites for the Prairie Creek (0606A). RUAA sites corresponds to site descriptions in Table B1.8.

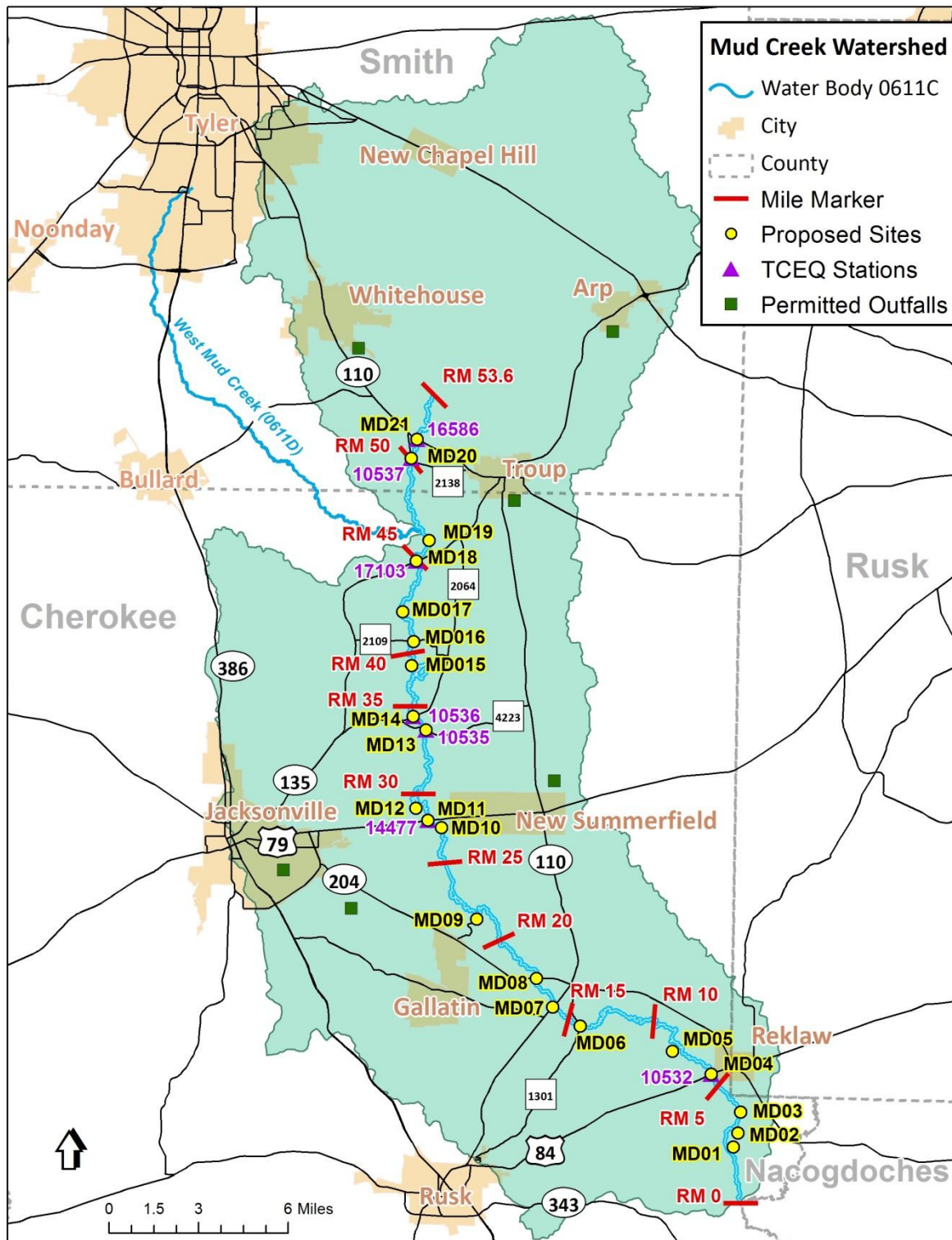


Figure Appendix A.10. RUAA survey sites for the Mud Creek (0611C). RUAA sites corresponds to site descriptions in Table B1.9.

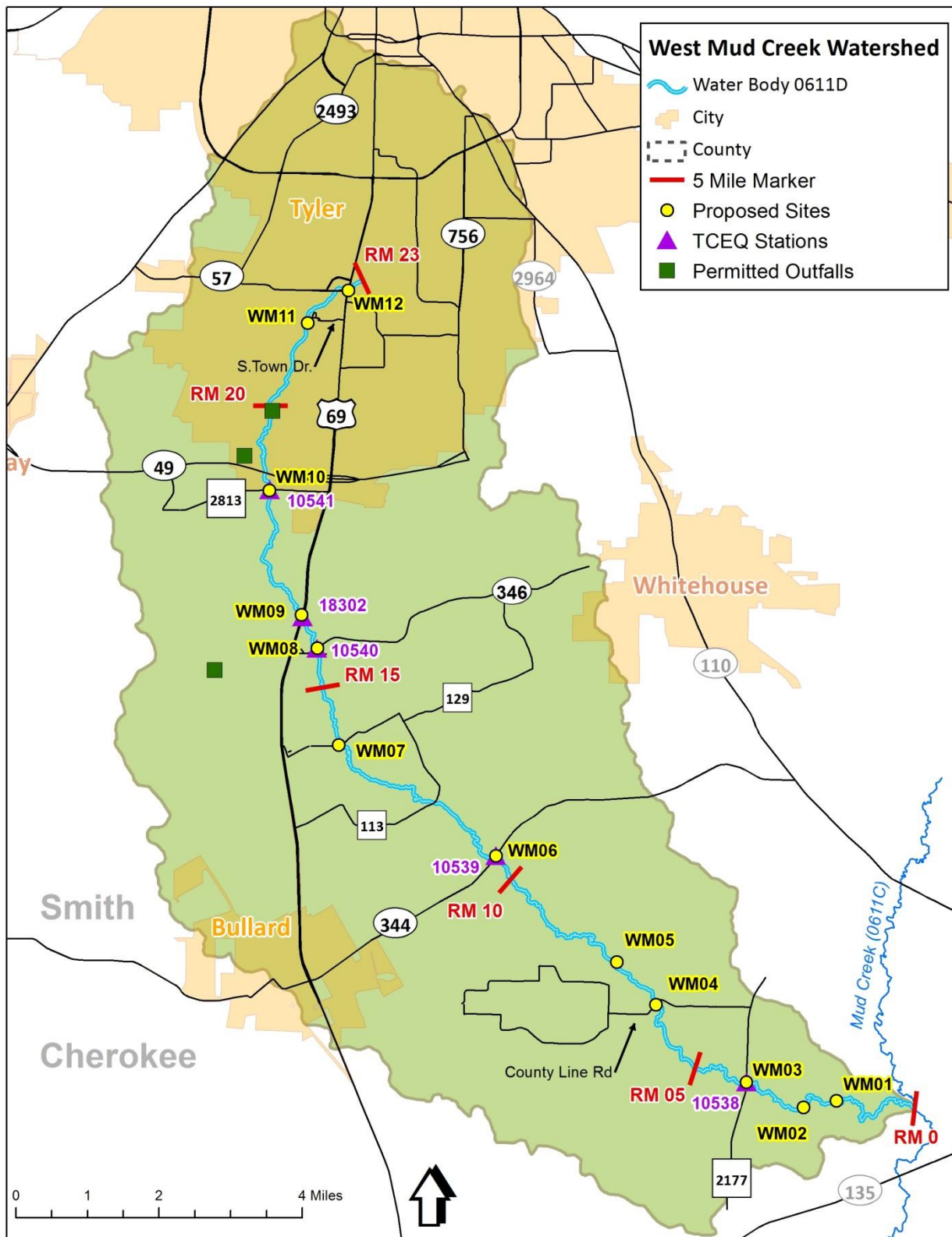


Figure Appendix A.11. RUAA survey sites for the West Mud Creek (0611D). RUAA sites corresponds to site descriptions in Table B1.10.

Appendix B: RUAA Field Data Sheets

Field Data Sheets –RUAA Survey
(complete for each site)

Site:

Data Collectors & Contact Information:	
Date & Time:	County Name:
Stream Name:	
Segment No. or nearest downstream Segment No.:	
Description of Site:	

A. Stream Characteristics:

1. Check the following channel flow status that applies.

☐ dry ☐ no flow ☐ low ☐ normal ☐ high ☐ flooded

2. Check the following stream type that applies on the day of the survey:

☐ Ephemeral: A stream which flows only during or immediately after a rainfall event, and contains no refuge pools capable of sustaining a viable community of aquatic organisms.

☐ Intermittent: A stream which has a period of zero flow for at least one week during most years. Where flow records are available, a stream with a seven-day, two-year low-flow (7Q2) flow of less than 0.1 cubic feet per second is considered intermittent.

☐ Intermittent w/ perennial pools: An intermittent stream which maintains persistent pools even when flow in the stream is less than 0.1 cubic feet per second.

☐ Perennial: A stream which flows continuously throughout the year. Perennial streams have a 7Q2 equal to or greater than 0.1 cubic feet per second.

☐ Designated or unclassified tidal stream: A stream that is tidally influenced. If you checked this box, you will need to contact the TCEQ Water Quality Standards Group and evaluate whether or not a bathing beach is located along the tidal stream and whether or not a bathing beach is located along the estuary, bay or Gulf water that the tidal stream flows into.

3. Riparian Zone (Mark dominant categories with L (Left Bank) and R (Right Bank). Bank orientation is determined by the investigator facing downstream.)

<input type="checkbox"/> Forest	<input type="checkbox"/> Urban	<input type="checkbox"/> Rip rap
<input type="checkbox"/> Shrub dominated corridor	<input type="checkbox"/> Pasture	<input type="checkbox"/> Concrete
<input type="checkbox"/> Herbaceous marsh	<input type="checkbox"/> Row crops	Other (specify): _____
<input type="checkbox"/> Mowed/maintained corridor	<input type="checkbox"/> Denuded/Eroded bank	

4. Ease of bank access to the water body: ☐ Easy ☐ Moderately easy ☐ Moderately difficult ☐ Difficult

5. Please describe access opportunities or explain why the site is not easily accessible (Attach photos for documentation):

6. Dominant Primary Substrate

☐ Cobble ☐ Sand ☐ Silt ☐ Mud/Clay ☐ Gravel ☐ Bedrock ☐ Rip rap ☐ Concrete

Field Data Sheets –RUAA Survey

Stream Name _____ Site: _____
Date: _____ Time: _____

B. Primary Contact Water Recreation Evaluation:

- Primary contact recreation definition: Activities that are presumed to involve a significant risk of ingestion of water (e.g. wading by children, swimming, water skiing, diving, tubing, surfing, and the following whitewater activities: kayaking, canoeing, and rafting).

1. Were water recreation activities that involve a significant risk of ingestion (full body immersion) observed at this site?

☐ Yes ☐ No primary contact recreation activities were observed

a. Check the following boxes of primary contact recreation activities observed at the time of the sampling event at the site (Attach photos of the activities or lack of activities).

- | | |
|--|---|
| <input type="checkbox"/> Wading-Children | <input type="checkbox"/> Tubing |
| <input type="checkbox"/> Wading-Adults | <input type="checkbox"/> Surfing |
| <input type="checkbox"/> Swimming | <input type="checkbox"/> Whitewater-kayaking, canoeing, rafting |
| <input type="checkbox"/> Water skiing | <input type="checkbox"/> Other : _____ |
| <input type="checkbox"/> Diving | <input type="checkbox"/> frequent public swimming-created by publicly owned land or commercial operations |

b. Check the number of individuals observed at the site: ☐ None ☐ 1-10 ☐ 11-20 ☐ 20-50 ☐ greater than 50

c. Check the following that apply regarding the individuals proximity to the water body.

- ☐ Water in mouth or nose of the individual ☐ Primary touch: Individual's body (or portion) immersed in water
☐ Secondary touch: fishing, pets and related contact with water ☐ Individual is in a boat touching water
☐ Individual is on shore near water within 8 meters (25ft) of water ☐ Individual is well away from water between 8 and 30 meters (100 ft) ☐ Not applicable

2. If primary contact recreation activities are not observed, describe the physical characteristics of the water body that may hinder the frequency of primary contact (depth, etc.) (Attach photos, etc. for documentation).

3. Describe if there is public access (e.g. parks, roads, etc.) (Attach photos, maps, etc. for documentation).

4. Is an area with primary contact recreation activities or a bathing beach (e.g. state/local parks with swimming, etc.) located near (e.g. within 5 miles upstream and downstream) this site?

C. Secondary Contact Water Recreation Evaluation:

- Secondary contact recreation 1: Activities that commonly occur but have limited body contact incidental to shoreline activity (e.g. fishing, canoeing, kayaking, rafting and motor boating). These activities are presumed to pose a less significant risk of water ingestion than primary contact recreation but more than secondary contact recreation 2.

- Secondary contact recreation 2: Activities with limited body contact incidental to shoreline activity (e.g. fishing, canoeing, kayaking, rafting and motor boating) that are presumed to pose a less significant risk of water ingestion than secondary contact recreation 1. These activities occur less frequently than secondary contact recreation 1 due to physical characteristics of the water body or limited public access.

Field Data Sheets –RUAA Survey

Stream Name: _____ Site: _____

Date: _____ Time: _____

1. Were water recreation activities observed at the site, but the nature of the recreation does not involve a significant risk of ingestion (e.g. secondary contact recreation activities)? ☐ Yes ☐ No secondary contact recreation activities were observed

a. Check the following boxes of secondary contact recreation activities that were observed at the time of the sampling event at the site (Attach photos of activities or lack of activities).

- ☐ Fishing
☐ Boating-commercial, recreational
☐ Non-whitewater-kayaking, rafting, canoeing
☐ No secondary contact recreation activities were observed
☐ Other secondary contact activities: _____

b. Check the number of individuals observed at the site.

- ☐ None ☐ 1-10 ☐ 11-20 ☐ 20-50 ☐ greater than 50

c. Check the following that apply regarding the individuals proximity to the water body.

- ☐ Secondary touch: fishing, pets and related contact with water ☐ In a boat touching water
☐ Body on shore near water within 8 meters (25ft) of water ☐ Body well away from water between 8 and 30 meters (100 ft)

2. If secondary contact recreation activities are not observed, describe the physical characteristics of the water body that may hinder the frequency of secondary contact (Attach photos, etc. for documentation).

3. If secondary contact recreation activities are observed, how often do water recreational activities occur that do not involve a significant risk of water ingestion? ☐ frequently ☐ infrequently

Please describe how often the activities occur? ☐ Unknown ☐ Never ☐ Daily ☐ Monthly ☐ Yearly

4. If infrequently, what is the reason? ☐ physical characteristics of the water body ☐ limited public access
☐ other

If other, list reasons: _____

5. Describe the physical characteristics of the water body that hinders the frequency of secondary contact recreation (depth, etc.) (Attach photos or depth measurements, etc. for documentation).

6. Describe why there is limited public access (e.g. lack of roads, river or stream banks overgrown, etc.) (Attach photos, maps, etc. for documentation).

D. Noncontact Recreation Evaluation

Noncontact recreation applies to water bodies where recreation activities do not involve a significant risk of water ingestion (e.g. activities with limited body contact incidental to shoreline activity, including birding, hiking, and biking), and where primary and secondary contact recreation uses do not occur because of unsafe conditions, such as barge traffic.

1. Provide site-specific information and documentation (including photographs) regarding unsafe conditions, recreation activities, and presence or absence of water recreation activities.

Field Data Sheets –RUAA Survey

Stream Name _____ Site: _____

Date: _____ Time: _____

E. Stream Channel and Substantial Pools Measurements

Please check the following which best describes the river or stream (A non-wadeable stream is one that is too deep to wade. Dry streams are considered wadeable.): ☐ Wadeable ☐ Non-wadeable

1. Wadeable Streams

Determine whether or not the average depth at the thalweg is greater than 0.5 meters and if there are substantial pools with a depth of 1 meter or greater. Walk an approximately 300 meter reach (total) at the site and take the following measurements within the 300 meter reach. Measurements should be taken during dry weather flows (sustained or typical dry, warm-weather flows between rainfall events, excluding unusual antecedent conditions of drought or wet weather

Also, take photos facing upstream, downstream, left bank, and right bank at 0 meters, 150 meters, and 300 meters.

Photos #s (0 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____

Photos #s (150 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____

Photos #s (300 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____

a) Substantial pools - Measure the length of each pool within the 300 meter reach (if > 10 pools only measure 10 pools). Also measure the width (at the widest point) and deepest depth of each pool. A substantial pool is considered a pool greater than 10 meters in length for the purposes of a RUAA Survey. Report measurements to two significant figures. If depths are too deep to measure then report >1.5 meters.

	Length (meters)	Width (meters)	Depth (meters)
Pool 1			
Pool 2			
Pool 3			
Pool 4			
Pool 5			
Pool 6			
Pool 7			
Pool 8			
Pool 9			
Pool 10			

b) Average depth at the thalweg -Take depth measurements every 30 meters within the 300 meter reach to calculate an average depth at the thalweg (at least 11 measurements needed). Report measurements to two significant figures. If depths are too deep at a particular transect to measure then report >1.5 meters. Use 1.5 when calculating the mean.

Distance	Depth (meters)
0 meters	
30 meters	
60 meters	
90 meters	
120 meters	
150 meters	
180 meters	
210 meters	
240 meters	
270 meters	
300 meters	
Average	

Field Data Sheets –RUAA Survey

Stream Name _____ Site: _____
Date: _____ Time: _____

c) Stream width - Measure (1) the width at one point which represents the typical average width of the 300 meter reach; (2) the width at the narrowest point of the stream within the 300 meter reach; and (3) the width at the widest point of the stream within the 300 meter reach. Report measurements to two significant figures.

Measurement Type	Width (meters)
Typical Average Width of 300 meter reach	
Width at narrowest point of the stream within 300 meter reach	
Width at the widest point of the stream within 300 meter reach	

2. Non-wadeable Streams

If accessible, take 11 width measurements which represent typical widths of the 300 meter reach. If the water is too deep the entire 300 meter reach then record the estimated average width of the water body. Report measurements to two significant figures.

Also, take photos facing upstream, downstream, left bank, and right bank at 0 meters, 150 meters, and 300 meters.

Photos #s (0 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____
Photos #s (150 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____
Photos #s (300 meters) Upstream _____ Downstream _____ Left Bank _____ Right Bank _____

# Measurements	Width (meters)
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

Field Data Sheets –RUAA Survey

Stream Name _____ Site: _____
Date: _____ Time: _____

F. Additional RUAA Information. Summarize your observations for the entire 300 meter reach.

1. Check the following activities observed over the site reach.

- | | |
|---|---|
| <input type="checkbox"/> Drinking or water in mouth | <input type="checkbox"/> Playing on shoreline |
| <input type="checkbox"/> Bathing | <input type="checkbox"/> Picnicking |
| <input type="checkbox"/> Walking | <input type="checkbox"/> Motorcycle/ATV |
| <input type="checkbox"/> Jogging/running | <input type="checkbox"/> Hunting/Trapping |
| <input type="checkbox"/> Bicycling | <input type="checkbox"/> Wildlife watching |
| <input type="checkbox"/> Standing | <input type="checkbox"/> None |
| <input type="checkbox"/> Sitting | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Lying down/sleeping | |

2. Are there permanent or long-term hydrologic modifications that are constructed and operated in a way that affects the recreational uses? ☐ Yes ☐ No (If yes, please provide supporting documentation and photos.)

Comments: _____

3. Check any channel obstructions that apply (Attach photos).

- | | | | | |
|---------------------------------------|---|---|--------------------------------------|--|
| <input type="checkbox"/> Culverts | <input type="checkbox"/> Fences | <input type="checkbox"/> Log jams | <input type="checkbox"/> Rip rap | <input type="checkbox"/> Water control structure |
| <input type="checkbox"/> Barbed wire | <input type="checkbox"/> Dams | <input type="checkbox"/> Thick vegetation | <input type="checkbox"/> Low bridges | <input type="checkbox"/> None |
| <input type="checkbox"/> Utility pipe | <input type="checkbox"/> Other (specify): _____ | | | |

4. Check all surrounding conditions that promote recreational activities (Attach photos of evidence or unusual items of interest).

- | | | | |
|--|---|---|--|
| <input type="checkbox"/> Campgrounds | <input type="checkbox"/> Stairs/walkway | <input type="checkbox"/> Roads (paved/unpaved) | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> Playgrounds | <input type="checkbox"/> Boating access (ramps) | <input type="checkbox"/> Populated area | <input type="checkbox"/> None of the Above |
| <input type="checkbox"/> Rural area | <input type="checkbox"/> Beach | <input type="checkbox"/> Docks or rafts | |
| <input type="checkbox"/> Residential | <input type="checkbox"/> Bridge crossing | <input type="checkbox"/> Commercial outfitter | |
| <input type="checkbox"/> National forests | <input type="checkbox"/> Commercial boating | <input type="checkbox"/> Trails/paths (hiking/biking) | |
| <input type="checkbox"/> Urban/suburban location | <input type="checkbox"/> Nearby school | <input type="checkbox"/> Power Line Corridor | |
| <input type="checkbox"/> Golf Course | <input type="checkbox"/> Paved parking lot | <input type="checkbox"/> Parks (national/city/county/state) | |
| <input type="checkbox"/> Sports Field | <input type="checkbox"/> Unimproved parking lot | <input type="checkbox"/> Public Property | |

Comments: _____

5. Check all surrounding conditions that impede recreational activities (Attach photos of evidence or unusual items of interest).

- | | |
|---|---|
| <input type="checkbox"/> Private Property | <input type="checkbox"/> Fence |
| <input type="checkbox"/> No trespass sign | <input type="checkbox"/> Barge/ship traffic |
| <input type="checkbox"/> Wildlife | <input type="checkbox"/> Industrial |
| <input type="checkbox"/> Steep slopes | <input type="checkbox"/> None of the Above |
| <input type="checkbox"/> No public access | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> No roads | |

Comments: _____

6. Check any indications of human use (Attach photos).

- | | | | |
|--|---|---|--|
| <input type="checkbox"/> Roads | <input type="checkbox"/> RV/ATV Tracks | <input type="checkbox"/> NPDES Discharge | <input type="checkbox"/> Organized event |
| <input type="checkbox"/> Rope swings | <input type="checkbox"/> Camping Sites | <input type="checkbox"/> Gates on corridor | <input type="checkbox"/> No Human Presence |
| <input type="checkbox"/> Dock/platform | <input type="checkbox"/> Fire pit/ring | <input type="checkbox"/> Children's toys | |
| <input type="checkbox"/> Foot paths/prints | <input type="checkbox"/> Fishing Tackle | <input type="checkbox"/> Remnants of kids' play | |
| <input type="checkbox"/> Other: _____ | | | |

Comments: _____

Field Data Sheets –RUAA Survey

Stream Name _____ Site: _____

Date: _____ Time: _____

7. Please list any additional items that may impede recreation, such as excessive aquatic vegetation or algae, excessive debris, garbage, snakes, alligators, abundant wildlife, etc.? (Attach photos)

8. Please list any evidence of sustained aquatic habitat such as clam shells, aquatic or marsh vegetation, turtle shells, etc. (Attach photos)

9. Is the site located in a wildlife preserve with large wildlife (i.e waterfowl) population? ☐ Yes ☐ No

10. Please document any other relevant information regarding recreational activities and the water body in general (for example, area outside of the stream reach evaluated).

<u>Severity Value</u>	<u>Description</u>
<input type="checkbox"/> 1 No Flow	When a flow severity of 1 is recorded for a sampling visit, record a flow value of 0 ft/s (using parameter code 00061) for that sampling visit. A flow severity of 1 describes situations where the stream has water visible in isolated pools. There should be no obvious shallow subsurface flow in sand or gravel beds between isolated pools. "No flow" not only applies to streams with pools but also to long reaches of streams that have water from bank to bank but no detectable flow.
<input type="checkbox"/> 2 Low Flow	When streamflow is considered low, record a flow-severity value of 2 for the visit, along with the corresponding flow measurement (parameter code 00061). In streams too shallow for a flow measurement where water movement is detected, record a value of < 0.10 ft/s. <i>Note:</i> Use a stick or other light object to verify the direction of water movement. Make sure the movement is downstream and not the effect of wind. What is low for one stream could be high for another.
<input type="checkbox"/> 3 Normal Flow	When streamflow is considered normal, record a flow severity value of 3 for the visit, along with the corresponding flow measurement (parameter code 00061). "Normal" is highly dependent on the stream. Like low flow, what is normal for one could be high or low for another.
<input type="checkbox"/> 4 Flood Flow	Flow-severity values for high and flood flows have long been established by the EPA and are not sequential. Flood flow is reported as a flow severity of 4. Flood flows are those which leave the confines of the normal stream channel and move out onto the floodplain (either side of the stream).
<input type="checkbox"/> 5 High Flow	High flows are reported as a flow severity of 5. High flow would be characterized by flows that leave the normal stream channel but stay within the stream banks.
<input type="checkbox"/> 6 Dry	When the stream is dry, record a flow-severity value of 6 for the sampling visit. In this case the flow (parameter code 00061) is not reported. This will indicate that the stream is completely dry with no visible pools.

Appendix C: Contact Information and RUAA Interview Forms

Contact Information Form

(This form must be completed prior to conducting a RUAA survey.)

River or stream name: _____

Notify the contacts that a recreational use-attainability analysis is being planned for the river or stream. Document whether or not the entity was notified, the name of the person contacted, and the date they were notified about the proposed RUAA project.

Required Local Contacts:

TCEQ region staff	Notified: <input type="checkbox"/> Yes <input type="checkbox"/> No Date: _____ Name: _____
Clean Rivers Partners (River Authority and other local partners)	Notified: <input type="checkbox"/> Yes <input type="checkbox"/> No Date: _____ Name: _____
Texas Parks and Wildlife Department Point of Contact: Cindy Hobson 512.389.8195 cindy.hobson@tpwd.texas.gov	Notified: <input type="checkbox"/> Yes <input type="checkbox"/> No Date: _____
Texas State Soil Water Conservation Board Point of Contact: T.J. Helton 254.773.2250 ext. 234 thelton@tsswcb.texas.gov	Notified: <input type="checkbox"/> Yes <input type="checkbox"/> No Date: _____

Suggested Additional Local Contacts to Notify (Notify the contacts that a recreational use-attainability analysis is being planned for the river or stream. If contacted, include whether or not the entity was notified, the name of the person contacted, and the date they were notified about the proposed RUAA project on a separate page and attach it to this form):

Local Parks and Recreation Departments	Yes <input type="checkbox"/> No <input type="checkbox"/>
Local Government/Jurisdiction	Yes <input type="checkbox"/> No <input type="checkbox"/>
Local Recreation Groups	Yes <input type="checkbox"/> No <input type="checkbox"/>
Conservation Groups	Yes <input type="checkbox"/> No <input type="checkbox"/>
Local County Extension Agent	Yes <input type="checkbox"/> No <input type="checkbox"/>
Watershed Groups	Yes <input type="checkbox"/> No <input type="checkbox"/>
Long-term Landowners/Adjacent Landowners	Yes <input type="checkbox"/> No <input type="checkbox"/>
Texas Stream Team	Yes <input type="checkbox"/> No <input type="checkbox"/>
Canoe Clubs	Yes <input type="checkbox"/> No <input type="checkbox"/>
City Commissioners Office	Yes <input type="checkbox"/> No <input type="checkbox"/>
Real estate agents	Yes <input type="checkbox"/> No <input type="checkbox"/>
Local non-profits	Yes <input type="checkbox"/> No <input type="checkbox"/>
City/county offices (Engineer, Health, Law Enforcement)	Yes <input type="checkbox"/> No <input type="checkbox"/>
Flood control districts	Yes <input type="checkbox"/> No <input type="checkbox"/>
Councils of Government	Yes <input type="checkbox"/> No <input type="checkbox"/>
TPWD Game Warden	Yes <input type="checkbox"/> No <input type="checkbox"/>
Other: _____	Yes <input type="checkbox"/> No <input type="checkbox"/>

RUA Interview Form

Stream Name: _____ Segment #: _____ Site: _____

Interviewer's Name: _____

Date & Time (include AM or PM): _____

Interviewed: ☐ In person ☐ By phone ☐ By mail ☐ By e-mail

☐ No interviews were conducted

If no interviews were conducted, please provide an explanation:

*Are you willing to respond to a short survey about this stream? ☐ Yes ☐ No

Interviewee selected because (e.g., resource manager, Gov. official, conservationist, property owner, local resident, standing by stream, etc.)

Questions:

1. Are you familiar with this stream? ☐ Yes ☐ No If yes, how many years? _____
If yes, proceed to #2. If no, stop here and do not conduct an interview.

2. What location(s) along the stream are you familiar with:

3. Have the interviewer characterize the stream flow. Since the interviewer may not be familiar with TCEQ's definitions or distinction between the different water bodies, please refer to the definitions listed below when asking this question.

☐ Ephemeral: A stream which flows only during or immediately after a rainfall event

☐ Intermittent: A stream which has a period of zero flow for at least one week during most years. (Channel contains flowing water for only a portion of the year and surface water may be absent at times.)

☐ Intermittent w/ perennial pools: An intermittent stream which maintains persistent pools even when flow in the stream is less than 0.1 cubic feet per second. (When not flowing, the water may remain in isolated pools.)

☐ Perennial: A stream which flows continuously throughout the year.

4. Have you or your family personally used the stream for recreation? ☐ Yes ☐ No
If yes, proceed to #6. If no, proceed to #5.

5(a). List reasons stream not used. _____

5(b). Proceed to #7.

RUAA Interview Form

Stream Name: _____ Segment #: _____ Site: _____

- 6.) a) How do you use the stream? ☐ Swimming ☐ Wading-Children
☐ Water Skiing ☐ Wind surfing ☐ Tubing ☐ Wading-Adults
☐ Hunting ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Skin Diving

b) When did these uses occur (e.g. year(s); season) and how often (times/year)?

c) What location did these uses occur (get specific location and mark on a map)?

7. Have you observed others using this stream for recreation? ☐ Yes ☐ No
If yes, proceed to #8. If no, proceed to #9.

8. a) What kinds of uses have you witnessed? ☐ Swimming ☐ Wading-Children
☐ Water Skiing ☐ Wind surfing ☐ Tubing ☐ Wading-Adults
☐ Hunting ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Skin Diving

b) When did these uses occur (e.g. year(s); season) and how often (times/year)?

c) What location did these uses occur (get specific location and mark on a map)?

9. Have you heard about anyone using this stream for recreation? ☐ Yes ☐ No
If yes, proceed to #10. If no, conclude the interview.

10. a) What kind of uses have you heard about? ☐ Swimming ☐ Wading-Children
☐ Water Skiing ☐ Wind surfing ☐ Tubing ☐ Wading-Adults
☐ Hunting ☐ Kayaking ☐ Rafting ☐ Trapping ☐ SCUBA diving
☐ Snorkeling ☐ Fishing ☐ Boating ☐ Canoeing ☐ Skin Diving

b) When did these uses occur (e.g. year(s); season) and how often (times/year)?

c) What location did these uses occur (get specific location and mark on a map)?

11. Can you recommend someone else we could contact that knows the stream? ☐ Yes ☐ No
If yes, list person's contact information: _____

12. Additional comments (from the interviewee or interviewer):

Appendix D: Corrective Action Report Form

Corrective Action Report

SOP-Q-105
CAR #: 08-003

Report Initiation Date _____ Report By: _____ Procedure or QC Typ _____

Deviation: _____

Analyte: _____

Affected Sample #s: _____

Sampling Station: _____

Project(s): _____

**Attached
Documentation:**

- ☐ COC
- ☐ FDS
- ☐ FlowLink
- ☐ Flow8
- ☐ GM
- ☐ Log Book
- ☐ QC Sheet
- ☐ Memo
- ☐ Other

Details of the problem, nonconformance or out-of-control situation:

Possible Causes:

Corrective Actions Taken:

Corrective Actions Suggested:

CAR routed to: _____ Date: _____

Supervisor:

☐ Tier 1 (does not affect final data integrity) ☐ Tier 2 (data accepted but flag required) ☐ Tier 3 (possibly affects final data integrity)

Corrective actions taken for specific incident: _____

Corrective actions taken to prevent recurrences: _____

Corrective actions to be taken: _____

Responsible Party: _____ Proposed completion date: _____

Effect on data quality: _____

Responsible Supervisor: _____ Date: _____

Concurrence:

Program/Project Manager: _____ Date: _____
(Tier 3 CARs only)

Quality Assurance Officer: _____ Date: _____